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EPILEPSY

WITH SPECIAL REFERENCE TO TREATMENT *

FRANCIS X. DERCUM, M.D.

PHILADELPHIA

A disease as old as epilepsy is always interesting and constantly demands our best efforts for its alleviation and its possible cure. In order to approach its treatment intelligently, it is necessary first that we obtain as clear conceptions as possible concerning its nature. Let us, therefore, briefly review some of the essential facts.

It is at once evident that in a large number of cases the history of epilepsy begins before the individual is born, indeed, before the foundation of the organism is laid. All writers, ancient and modern, lay stress on the factor of heredity. Most writers content themselves with the general statement, others express the fact in percentages. Gowers, for instance, found hereditary factors at one time in 35 per cent., and at another time in 46 per cent. of his cases, Ahronson in 32 per cent., Siebold in 55.2 per cent., Dejerine in 66.8 per cent., Binswanger in 61.7 per cent., and Kraepelin in 45.7 per cent. An unusually low percentage is given by Petges and Cardenal, namely, 22 per cent. Differences in the estimates made by different observers are doubtless to be explained by differences as to what they have included under hereditary factors. The results, however, justify the conclusion that in a large number of cases these factors are present. If all forms of nervous and mental diseases in the ancestry are included, the percentage, of course, rises. If the inquiry is restricted to the transmission of epilepsy alone, the percentage, of course, falls. The results must further vary whether we include a general or collateral family history of epilepsy or whether we limit our studies to its direct inheritance. Again, Kraepelin found in 303 men 44.5 per cent. presenting a family history of nervous and mental diseases, but only 32.7 per cent. presenting such a history in the immediate parents of the patients. Further, when the inquiry was restricted to the occurrence of epilepsy alone, a general family history of epilepsy was found in 13.2 per cent., and its direct transmission from parent to child in only 6.3 per cent. In 104 women, Kraepelin found 49 per cent. with a general family history and 39.7 per cent. with a direct history of nervous and mental diseases; 17.3 per cent. with a general family history of epilepsy and 11.5 per cent. with a direct history. It would appear that a family history of nervous and mental diseases is of great significance, and this is indeed in accord with general experience.

Other facts must also be taken into account. Among these is alcoholism in the ancestry. That the children of alcoholics frequently suffer from epilepsy is well known. Kraepelin, for instance, found a direct alcoholic ancestry in 18.2 per cent. of 303 men and in 19.2 per cent. of 104 women. That there is here a direct damage of the germ plasm there can be no doubt. Again, the rôle which syphilis in the ancestry plays is also an important one. It is probable that syphilis acts much as alcohol does, namely, by damaging the germ plasm. In a given number of our cases, moreover, the actual evidence of syphilis can be demonstrated clinically and by the Wassermann reaction in the epileptic children. In other cases, while it cannot be asserted that the patients suffer from inherited syphilis, it is probable that the development of the organism has been hampered, arrested, and made deviate and degenerate by the presence of the spirochete and its toxins. In the larger number of cases, however, it is probable that the baneful effect of syphilis in the parent has expended itself mainly in an impairment of the germ plasm. It is probable that toxic factors in the ancestry other than those mentioned, such as lead poisoning and the various infections generally, occurring in the ancestry, may damage the germ plasm so as to lead to the production of epilepsy in the descendants; but of this our knowledge is as yet insufficient to speak definitely. However, that the damage to the germ plasm from the various causes mentioned is not theoretical but actual and real is proved by the signs of morphologic arrest and deviation so commonly present. Among these are the anomalies in the size and shape of the skull, the high and narrow palate, the anomalies of dentition, of the ears, of the digits and of the general development. We must remember, too, that the signs of arrest and deviation accessible to observation are merely surface indications of other and more fundamental deviations present in the organism throughout.

Approaching the subject from whatever point of view we choose, the inference is unavoidable that in a large number of epileptics there has been a primary, a basic impairment of the germ plasm. It would appear that this impairment may be general in character, the result of various nervous and mental diseases or of various intoxications and infections in the ancestry; or, the impairment may be special in character and may result in the special transmission of epilepsy.

Concerning the direct production of epilepsy in the individual himself by intoxications and infections, the evidence is overwhelming. This is notably true of alcohol. The sufferer from alcoholic epilepsy is the not infrequent subject of both outpatient and hospital care. Lead poisoning also plays a rôle here, but naturally a less important rôle. Regarding the infections

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and the rôle which they play in the production of epilepsy, the evidence is also quite conclusive. The convulsions which now and then accompany the infectious diseases of childhood are to be regarded merely as epiphenomena of the infectious processes, and are to be explained by a direct toxic action on the cortex. Quite commonly they disappear with the infection; they are of consequence only when they persist subsequently. Unfortunately, they occasionally persist as established epilepsies. Again, epilepsy every now and then follows an attack of typhoid or of scarlet fever, less frequently of measles, whooping cough or influenza. Not uncommonly there is a history of convulsions accompanying the infection, and then, after an interval, possibly of months or of years, the establishment of epileptic attacks follows. It is probable that in such cases an encephalitis, probably localized and cortical, occurred during the febrile infection, followed subsequently by sclerotic changes, perhaps slight in character, but sufficient to act as the starting point of future epileptic seizures. I have only recently studied a case of this kind, one in which an attack followed by weakness of one half of the body occurred during the course of typhoid fever, and in which some years later typical epileptic seizures supervened. The occurrence of epilepsy as a sequel of encephalitis the result of infection has been emphasized by Freud, Rie, Marie, Renlich and others.

Another factor in the history of epilepsy is that of trauma. Here again the facts are such as not to admit of dispute. Certain it is that cases are constantly encountered in the clinics, in which injury to the brain has been followed after a longer or shorter interval by epilepsy. Epilepsy following injury to the brain is frequently jacksonian in type, but it is not improbable that changes may supervene in the traumas of childhood which may later give rise to the picture of a generalized epilepsy. It is exceedingly probable that in the epilepsies which supervene after intoxications, infections and traumas, actual changes are present in the cortex, possibly of the nature of mild and limited scleroses themselves the sequels of limited encephalitis. Allied to such epilepsies are the epilepsies seen in hemiplegic and diplegic children. Here atrophic and sclerotic changes more or less pronounced involve the motor area of one or both sides and serve as the cause of the convulsive seizures. It is significant in this connection that many epileptics are left handed; in these cases the left handedness is probably an acquired quality subsequent to a cortical left-sided damage in infancy or early life. In other cases, it is doubtless connected with some morphologic deviation. The epilepsies which are the result of coarse scleroses are in turn closely related to the epilepsies caused by neoplasms and gross lesions generally; these need not here detain us.

When we review the facts which have here been hastily summarized, one fact stands forth with striking prominence, namely, that epilepsy is not a specific clinical entity. Under the caption of epilepsy are included many symptom groups which differ widely as to their origin and pathology. Perhaps this is not surprising when we reflect on the physiology of the brain. It would appear that the motor area of the cortex responds by convulsive attacks to both chemical and physical irritants, and that there should be a multiplicity of causes, any one or number of which may bring about an epileptic symptom group, is perhaps just what we should have been led to expect.

The lesson taught by the pathologic findings at necropsy are also of great significance and in keeping with what has already been said. Many years ago, I placed on record anatomic studies of twelve epileptic brains all of which revealed more or less marked anomalies of the convolutions and fissures. These findings were all to be interpreted as phenomena of arrest and deviation. A similar interpretation is to be placed on the sclerosis of the cornu ammonis so much insisted on by earlier writers. Arrest and deviation are also the significance, as I have already pointed out, of the asymmetries, peculiarities and malformations of the skull.

Microscopic studies of the brain have sometimes revealed atrophic changes in the cortical cells, and sometimes a proliferation of the glia, more especially of the cortex in its outer layers, a proliferation which constitutes a kind of gliosis or sclerosis. Time will not permit of an enumeration of the findings in epilepsy; the thickening of the calvarium, the thickening of the membranes, the adhesion of the latter to the skull or brain, or the visceral changes which necropsies have from time to time revealed. Suffice it to say that no changes are constant, and this is the factor of most significance.

If we attempt to classify the epilepsies, we encounter great difficulties. It will not suffice, for instance, to divide them into those attended by gross organic changes, such as tumors, massive scleroses, traumatic disease and the like, and those in which no such factors are evident, for many of the latter may, on microscopic examination, reveal the very changes which constitute organic disease. We have seen how minute and varied may be the changes and how varied the causes. Moreover, it is especially in the group without apparent gross organic cause that hereditary factors play such an important rôle, and in many of this group, again, morphologic arrests and deviations are present which in turn give to the cases a profoundly organic character.

Some epileptics present symptoms suggestive of involvement of the internal secretions. That such symptoms should occasionally be present is not surprising when we reflect that anomalies of the glands of internal secretion are frequently closely bound up with arrest and deviation. No special internal symptom group is presented; occasionally there are modifications of stature and growth; coarseness, dryness, thickness or suspicious infiltration of the skin and, less often, special signs distinctly referable to individual glands are observed. In quite a number of epileptics I demonstrated years ago by Roentgen-ray examinations enlargement and distortion of the pituitary fossa due apparently to disease of the hypophysis.

Once more let it be emphasized that it is just in the group often embraced under the term "essential" epilepsy that we have to deal with persons in whom the development has taken place in an aberrant and damaged germ plasm, and in which the epilepsy is expressive of an endogenous, autotoxic deterioration. The evidence before us is such as to exclude specificity of cause. I am, of course, aware of the recent announcement by Reed of Cincinnati of the discovery of a germ as the cause of epilepsy. If the correctness of his observations be admitted, it must be equally conceded that they can bear but a limited relation to the great and varied group of diseased states embraced under epilepsy.

This consideration as to the nature of epilepsy has unfortunately occupied more time than I had originally intended, but an intelligent discussion of treatment is impossible without it. Clear ideas must obtain, first, as to the conditions which confront us and, secondly, as to the objects which we should seek to accomplish. A specific treatment of epilepsy is obviously out of the question, and the first step must be the intensive study of each individual case. This includes an elaborate study of the family and of the personal histories, a detailed neurologic and visceral examination, including, of course, the laboratory tests of the blood and at times of the cerebrospinal fluid, and, finally and especially, a search for the earmarks of arrest and deviation. The latter, it must be remembered, are not only physical but also mental. That the treatment must necessarily be influenced by the findings follows of necessity; especially is this true when the investigations reveal gross organic nervous lesions, visceral disease or active infectious processes. What shall we do, however, in the residue of cases in which the investigation reveals merely the defective, autotoxic and deteriorating organism outlined in this paper? The task is always difficult, often discouraging and at times hopeless. However, not infrequently much may be accomplished and, in a few cases, even definite arrest of seizures brought about.

The first indication is that the organism, though defective and deviate, shall lead as physiologic a life as is compatible with its structure. To attain this end, a life without physical or mental strain, close to nature, in camp or on the farm, should be adopted by the epileptic. This, indeed, is the principle applied in the various epileptic colonies. In a given number of cases it is attended by an improvement in general health and a notable diminution in the number of seizures. There can be no doubt that the benefit is largely due to the increased oxidation of waste and toxic substances and the general increase of physiologic efficiency which result from an outdoor life. In addition, three points should be borne in mind:

1. The diet should be so modified that in this organism, already toxic, as little strain as possible be placed on the liver, the thyroid and other defensive glands. For this reason the red meats are to be partaken of sparingly. The carbohydrates also are to be diminished. To take the latter in large amount is to hamper the oxidation of the tissues, an oxidation which for the obvious reason of the autotoxicity of the patient should be maintained at as high a level as possible. In the diet, emphasis should be laid on the white meats, the succulent vegetables and milk; eggs also may be permitted. Stimulants of all kinds are, of course, to be excluded.

2. The various avenues of elimination should be kept freely open. If the diet does not of itself counteract the constipation frequently present, a moderate dose of a simple saline or laxative water may be given daily. The patient should drink water freely between meals to promote the action of the kidneys, and should take a lukewarm sponge bath daily to promote the action of the skin. The bath should not be such as to promote an active reaction, but merely to favor elimination.

3. Resort to medicines must, of course, be had in many cases to influence or control the seizures. Time will not permit the extended discussion of these, but after all is said and done, experience teaches that chief reliance must be placed on the bromids. Regarding their efficient administration, however, one important point must be borne in mind, namely, the principle of sodium chlorid withdrawal introduced by Richet and Toulouse. If table salt is withheld, the bromids instead of being eliminated are retained and are effective in much smaller dose. I myself have been in the habit for many years past of administering the bromids in the form of sodium bromid, at the same time instituting as rigid a withdrawal of the sodium chlorid as possible. There can be no doubt that under these circumstances the sodium bromid takes the place, in a measure, of the sodium chlorid in the tissues. If, in a case so treated, the sodium bromid be discontinued and sodium chlorid resumed, the bromid is rapidly eliminated in the urine.

But one other point of importance remains. In a given number of instances, the physiologic level of the patient may be distinctly raised by the administration from time to time of small doses of thyroid extract; say from an eighth to a quarter of a grain three times daily, seldom more. Thyroid in small doses, long continued, stimulates the chain of glands of internal secretion, increases oxidation and promotes metabolism generally.

1719 Walnut Street.

ABSTRACT OF DISCUSSION

DR. DAVID F. WEEKS, Skillman, N. J.: I want to emphasize the importance of early recognition of symptoms that point toward beginning epilepsy. When the patient reaches the institution the disease has usually been of long standing. In the collection of data bearing on the heredity of patients at the New Jersey State Village for Epileptics at Skillman we were impressed with the importance of careful study of children subject to periods of unprovoked anger, joy, passion, weeping, etc., and accordingly undertook a special study of children of school age. For the purpose of checking our data our field workers investigated the heredity of children showing these epileptic characteristics and tendencies and reported the presence of the epileptic taint in many of these families. In some cases these potentially epileptic children later developed epileptic convulsions. School inspectors have an excellent opportunity of detecting these children before their seizures have been established, and by referring them to the family physician for such care and treatment as will put them under right living conditions may forestall the convulsions and reduce the number of epileptics. Our special classes should be reorganized to provide separate classes for epileptics, thus removing them from the classes as now established.

DR. A. L. SKOOG, Kansas City, Mo.: In connection with institutional or colony cases and cases seen in private practice, the point that strikes me in particular is the difference between the two classes of patients. It is true that a large percentage of the cases seen in colonies are of the chronic type. Their etiology is more obscure than that of the cases seen in private practice. Permanent damage has been done, and the etiologic factor or the immediate cause of the trouble is probably no longer at hand. I believe that the prognosis is better for cases observed in private practice than for those in colonies, for two reasons: First, they come at an earlier stage and you have better opportunity for a study of the etiology, and second, you can carry out certain treatments better. However, there are certain types of epilepsies that never should be taken care of in private practice. Such patients should be sent to a special colony for care and treatment. I like very much the way Dr. Dercum handled the subject from the standpoint of calling the condition *epilepsies*, not epilepsy. I believe it is now almost the universal opinion of students of this broad subject that we are dealing not with a single entity, but with a whole group of diseases involving the brain directly or indirectly. I believe it is possible that quite a number of epilepsies have their origin in mild or more severe degrees of encephalitis, secondary to one of the various

infectious diseases of children. It is true that a large number of epilepsies are still described under the idiopathic or genuine epilepsies, so called, and we can say regarding these that the etiology is obscure. Some of these cases may have their origin in functional disturbances. This also has a bearing on some of the findings observed at necropsy. Most cases of epilepsy come to the postmortem table at a late stage. Every seizure produces at least a small amount of damage to the brain. I have had opportunity of observing three generalized convulsions in epileptics at operations, two of them in the parietal or postrolandic region, and one in the frontal region close to the head centers. Two of the convulsions were produced by bipolar electrical stimulation. There was nothing focal about the convulsions in either one of these cases, being diffused immediately. But the essential point was the tremendous amount of intracranial pressure produced. The surgeon with whom I was working at the time became very much alarmed, fearing serious damage from bulging of the brain. As soon as the convulsive period was over, not occupying more than one and one-half minutes, the brain immediately receded. A condition like this undoubtedly presents the possibility of trauma to the cortex, and that trauma may increase the susceptibility to future seizures.

DR. FRANCIS R. FRY, St. Louis: I do not know how much other practitioners and particularly neurologists have been disturbed by a phase of so-called treatment now in vogue. We certainly find it a disturbance, because 50 per cent. of the epileptic patients who come to us inquire whether or not they shall go over to Cincinnati. Some extreme thing of this kind obtrudes itself from time to time, and particularly is this true in regard to chronic affections and often in regard to epilepsy. Therefore it is very timely at junctures of this sort that there should come forth some authoritative statement such as the paper that has just been read. Dr. Dercum has conscientiously told us all that is known to date about epilepsy from any scientific or rational, sensible standpoint. And among practitioners, at least, it is something definite to appeal to, coming from one of Dr. Dercum's standing.

DR. CHARLES R. BALL, St. Paul: I was much pleased that Dr. Dercum brought out the fact that epilepsy is composed of separate entities and is not a single distinct disease. It may come from a great number of causes. The cause may be mechanically irritative, from any organic disturbance in the brain; or it may be chemically irritative, due to a toxic condition. In this connection it is well to take into consideration the secretions of the ductless glands and the toxemias that they undoubtedly cause through irregularities of function. With reference to heredity and the influence that alcohol plays, might not the special influence of alcohol on these glandular structures be an explanation for the frequent occurrence of epilepsy in the offspring of alcoholics? I am continually impressed with the very close relationship which seems to exist between the so-called idiopathic epilepsy and migraine. Not only have I found migraine in the mother with epilepsy in the child or a reversal of these conditions but in the same patient the epileptic seizure being converted into a migraine. I have also seen migraine develop into epilepsy. We should attempt to do more for these patients. Anything suggested is worth while. I believe I have found something that is an improvement over the old bromid treatment, viz., luminal. It does not have the bad influence that the bromid has. In the great majority of instances patients can take it over a long period of time without untoward consequences. Once in a while a patient develops a rash or dermatitis. Luminal is chemically similar to veronal, except that the ethyl group in veronal is replaced by one phenyl group. I give ⅝ to 1 grain of luminal three times and sometimes four times a day. While I am not able to compete with the Cincinnati clinic in the number of patients as yet, nevertheless I find my cases increasing in number.

DR. WILLIAM RAVINE, Cincinnati: Dr. Dercum alluded to the reported finding of a specific organism in epilepsy by Dr. C. A. L. Reed. Dr. Wherry, bacteriologist of the Cincinnati General Hospital, did not find the specific organism, neither did his animal experimentation corroborate the findings of Reed; the organism did not fulfil all the requirements laid down by Koch. We in Cincinnati are not so very proud of the operation of "short-circuiting" for epilepsy. It is a far cry from intestinal stasis and its treatment to the cure of epilepsy. A great number of these afflicted individuals have come to Cincinnati. This procedure is quite an extreme measure to resort to in the treatment of epilepsy.

DR. JULIUS GRINKER, Chicago: Many of these forms of epilepsy are the result of lesions acquired perhaps early in childhood, but not discovered until long afterward, when the epileptic attacks have become thoroughly established. The real etiology of epilepsy is still to be discovered. It is true we have given bromid for many years, and we have not cured our patients, although many of them are kept at work, have become self-supporting, and in spite of the fact that they occasionally have an attack of epilepsy, they are useful members of the community. If we had not treated them medicinally, as some would have us do, and had experimented with the operative procedures which originated with gynecologists, many of these patients would have been lost and many others would have become invalids. Regarding the drugs to be used: The bromids are, after all, our main medicine in the treatment of epilepsy. There are patients, however, who cannot take bromids for even a short time without developing acne and pustular eruptions, and bromidism even after small doses. In some instances I have been handicapped in the management of epilepsy by the fact that patients could not even take a 10-grain dose of bromids. For this reason I have resorted to the use of luminal in some cases and the results obtained were very favorable. Many patients who could not take bromids well could take luminal in doses of 1½ grains once a day; others needed two doses daily; very few needed three doses of 1½ grains a day. There is one point in connection with the administration of luminal that I wish to emphasize: Having given luminal, do not change to bromids, because they become ineffective.

DR. R. A. GREENE, Palmer, Mass.: If there are no specific epilepsies, why is it that in institutions for the insane and feebleminded there are so many cases with exactly the same heredity, exactly the same lesions, and they do not have epilepsy? If there is not any specific epilepsy, why is it that some of these absolutely organic conditions such as the pronouncedly feebleminded and those with hemiplegia and all sorts of organic lesions, who are mental equals and look like our epileptic patients, do not have convulsions? Must there not be some specific cause of epilepsy? I do not believe that there is any micro-organism to be described, such as the *Bacillus epilepticus*. I can conceive that all epilepsies must have a primary status or causative factor in some metabolic abnormality or internal secretion that is not functioning properly.

DR. JAMES H. MCBRIDE, Pasadena, Calif.: There are of course many forms of epilepsy, and various causes: the epilepsy of traumatism, toxemia, peripheral irritation, etc. Two cases of epilepsy due to peripheral irritation that I recall are I think worthy of a brief mention. A woman at 30 developed epilepsy during confinement with her third and last child. She continued to have two or three fits a year until the time that I saw her when she was 63. On examination I found very large and badly ulcerated internal hemorrhoids. They were removed and she has not since had any recurrence of the fits, having now been entirely free from them for eleven years. A young man of 20 developed epilepsy while in college and during six months had two violent attacks of grand mal and many minor attacks. I found he had very large internal hemorrhoids which were removed. This was seven years ago and he has not had any recurrence of the fits. As a matter of pathologic interest I may mention the case of a man who was shot in the left eye at the battle of Gettysburg in 1863. He stated that he soon after developed epilepsy and up to the time of his death in 1889 had a discharge from the left ear.

On necropsy I found the bullet lying on the temporal bone just over the middle ear: It had entered at the orbit, passed to the temporal lobe and gravitated to the bone below, where

it had produced an abscess and necrosis of the bone by which the abscess had discharged into the middle ear and perforated the tympanum. The bullet which I removed in three pieces had remained in the skull cavity for twenty-three years.

DR. JOSEPH M. AIKIN, Omaha: I desire to make an inquiry regarding the relationship between migraine and epilepsy. In taking the history of patients complaining of epilepsy, I am impressed with the frequency of epilepsy, where there is a family history of migraine. I have wondered if the pathogenesis of migraine and epilepsy may not be practically the same, whether it be a specific germ or whatever the cause. I have in mind a young man whose history was that he had sick headaches until 17. At the age of 27 he came to me seeking relief from epilepsy, alleging that his epilepsy began at the age of 17, at which time his headaches ceased, and that his epileptic attacks had supplanted his headaches for ten years. Another case is that of a boy 8 years old who had a family history of migraine, suffered severe attacks of migraine till 14 years old, when without warning he had an epileptic convulsion. For six consecutive months he had on an average two or three epileptic convulsions a week, but no sick headaches. At the expiration of the six months the epileptic convulsions ceased and for eight years past he has what he had formerly, sick headaches. The relationship between the two conditions leads me to think of a toxemia of some kind, whether of endogenous or exogenous origin I do not know.

DR. WILLIAM J. HICKSON, Chicago: No one has mentioned the association of hysteria with epilepsy, and perhaps I should take that fact as evidence of its not being of significance. My cases are sent to me by the probate court, and I have made some detailed studies of the relationship of hysteria to epilepsy in certain cases. I am sure that I have done the patient, his family, and his community a real service by directing treatment to the hysteria and then turning the patient back with his small remnant of epilepsy.

DR. FRANCIS A. ELY, Des Moines, Iowa: Fortunately or unfortunately I have been recruited from the ranks of the general practitioners into those of the neurologists. I have had the opportunity of observing a great many instances of head trauma in children, and have attended a considerable number of difficult confinements. I am impressed with the fact that we should attach a great deal more importance to head trauma as a factor in the production of epilepsy. Since the Roentgen ray has come to our service it has been interesting to note that many instances of apparently slight head trauma in children have shown definite skull fractures and serious head lesions. We are all familiar with the great compressibility of the head of the child in coming through the birth canal, and those who have had any general practice will remember many instances in which infants have been very difficult to resuscitate. They will also perhaps remember many others in which, a week or so following birth, temporary epileptiform manifestations have occurred. I believe that in many instances such children in later life become epileptics, and I simply make this observation in order that we may not forget that head trauma both in the infant at birth and subsequent thereto are probably very important factors in the causation of epilepsy, and that there are many so-called idiopathic epilepsies which are indeed of traumatic origin.

There are undoubtedly a great many cases of encephalitis which escape the observation of the general practitioner and yet if these patients were subjected to a critical examination at the time of their illness, definite encephalitic symptoms might be observed. This type of cases also undoubtedly increase our list of those ascribed to unknown or idiopathic influences.

DR. C. EUGENE RIGGS, St. Paul: The pessimism of the profession with regard to the treatment of epilepsy has had a disastrous effect on the laity and consequently they have been willing to take hold of any will-o'-the-wisp that presented itself. Last month, at the meeting of the American Neurological Association in Washington, attention was called to the use of extract of pancreas in the treatment of epilepsy. Epileptics usually have a high blood pressure, which is indicative of epinephrin in excess. Pancreatin neutralizes this excess. It should be given in 5 grain doses, after meals. It certainly has a decided influence in lessening the frequency of the convulsive seizures. It has been in use such a short time that no statement can yet be made as to definite results. It should be given a fair trial.

DR. I. LEON MEYERS, Chicago: Epilepsy has from time to time been ascribed to structural changes in the brain. As a matter of fact, however, there is a striking difference between idiopathic epilepsy and jacksonian epilepsy. In idiopathic epilepsy there is practically always a loss of consciousness or at least a clouding of consciousness, whereas in jacksonian epilepsy consciousness is frequently retained. This shows that idiopathic epilepsy very frequently originates in parts of the brain other than the cerebral cortex. We know that we can remove the entire cerebrum without complete loss of consciousness; the loss of consciousness in idiopathic epilepsy would therefore point to an etiologic factor in the more vital centers of the brain. We are often impressed with the similarity between toxic epilepsy and idiopathic epilepsy. I had occasion to observe one case of idiopathic epilepsy in which the patient had typical tonic and clonic convulsions a short time after I had seen the convulsions in an animal on an injection of oil of absinthe and I was struck by the great similarity between the two. This would speak in favor of the toxic origin of epilepsy. It is well known that in producing convulsions in animals by the administration of strychnin or any of the other convulsants, if you touch the fur of the animal it promptly goes into convulsions. All that is needed to produce a powerful convulsion-reflex is the application of some kind of stimulus. This will explain the cases in which it has been noted that slight irritations produced attacks of idiopathic epilepsy. If the body is saturated with a poison having toxic properties similar to those of strychnin or absinthe, then a slight external stimulus is sufficient to produce generalized convulsions. This is evidenced also by the aura. It seems that there is some kind of poison in the blood affecting the lower level centers, and a slight stimulus which manifests itself by a certain aura brings about the generalized convulsions. But unconsciousness supervening immediately, the aura is cut off and the patient's knowledge of the stimulus is vague and indefinite. From my observations of convulsions in animals as well as in men, I believe that idiopathic epilepsy is toxic in origin, and not due to organic changes in the brain. Of course, organic changes in the brain may cause convulsions, but they are not, I think, the cause of genuine idiopathic epilepsy, and I heartily concur with Dr. Dercum who spoke of epilepsies and not epilepsy.

DR. DAVID S. BOOTH, St. Louis: It is quite evident that there are a great many causes of epilepsy, but many of them are toxic and I have no doubt that a large number of these result from toxins in the alimentary canal, especially in the intestines. A number of years ago Professor French of the Southern Illinois Normal University discovered an intestinal parasite which he called the *Gastropholus epileptalis*, and which he thought was the cause of many cases of epilepsy, hence the name given to it. However, the examination of the feces of, I believe, over a thousand cases revealed only a few infections with this parasite. So Professor French decided that this was not the cause of all the cases of epilepsy. Epilepsy may be due to rectal trouble, as I have noted in several cases. A case under observation was that of a physician in whom epilepsy was cured without any medicine whatever on the successful treatment of a rectal ulcer. As to treatment, parathyroid extract has not been mentioned, and I would like to know whether calcium has been used to any great extent. I have used calcium bromid with some good results, but perhaps no better than have been secured in some other cases not treated with this agent.

DR. ROBERT MCGREGOR, Saginaw, Mich.: I would like to ask Dr. Dercum if he has ever used, or heard of the use of, cerium oxalate in epilepsy. Usually the addition of strychnin or digitalis to a bromid mixture will lessen the amount required.

Dr. J. Matthew Pulliam, Fort Wayne, Ind.: I believe our main trouble is that the general practitioner throws up his hands in horror when an epileptic walks into his office, saying that there is no treatment. In my opinion the principal thing in the treatment of epilepsy is elimination, and I am not afraid of sodium chlorid and I do eliminate with sodium chlorid, giving a hard pressed normal saline tablet by mouth so that it will dissolve slowly in the stomach. I give with this a tablet composed of ⅓ gr. aloes, ⅓₀ gr. extract cascara segrada, 2½ gr. each of bicarbonate of soda, bicarbonate of potash and magnesium sulphate six times a day with a full glass of water. Just try it and see what the elimination is. That of itself will reduce the number of convulsions. There is nothing equal to bromid to stop convulsions. In looking over my records for the past ten years I find forty cases of epilepsy, thirty-two of which have had no attacks during a period ranging from two to eight years.

In regard to treatment with bromid, there is one point which may be applied to the dosage of bromid. Watch the blood for the hemoglobin content. Give the bromid until you have a drop in hemoglobin of 10 per cent., and you will find a drop in the hemoglobin content if you go high enough. Then cut the dosage in half, giving two weeks and intermitting two weeks. I accidentally discovered this fact nine years ago and have treated every case along this line. Up to this time I have not made any mention of it, not knowing whether the point was a practical one or not, as I have had but forty cases in which I could observe the effect. In the state institution at Logansport and Government Hospital at Washington, D. C., we had hundreds of cases, but all beyond the stage where we could do anything. Every one has neglected to treat the child. A girl came to me yesterday, aged 22, who at the age of 4 years had epileptic convulsions. A doctor treated her and her convulsive seizures ceased. On coming to womanhood she again developed epilepsy. The seizures started again when, because of development, extra work was put on the nervous system. Now I am giving bromid as I give iodin, in gradually ascending doses with remission, giving it two weeks and stopping two weeks. I take no account of a convulsive attack—it is not the cause, it is only the result. A toxic process is at the bottom of the trouble. Any man giving bromid without the promotion of elimination is wrong, although it does help for a time. So far as bromism is concerned, it is a very easy matter to prevent this. In regard to the skin eruption, Fowler's solution is specific. Give it in ascending doses in connection with bromid and you will not get much bromism.

Dr. Foster Kennedy, New York: We have had so many dogmatic assertions in this discussion of epilepsy that perhaps it would be well for us here and now to confess that we do not know anything definite about the etiology of this condition. The best proof of our ignorance is that so many different theories are put forward and accepted. From the West we hear of the epileptococcus and the removal of the large intestine, and from the East we are told that epilepsy represents an effort of the individual to resume his fetal position in the mother. All these various propositions are put forward perfectly seriously by speakers. While we can do a good deal to alleviate and to investigate, it is well at the outset, in order to reach the truth, to clear our minds of any delusions that we know much more than did our forebears about this subject.

Dr. Walter Timme, New York: We cannot treat epilepsy as a disease; we have to treat the epileptic as an individual. Therefore, in one case we get results with sodium chlorid, while with another we do not. Another point is this: That the introduction of the endocrine glands into the therapeutics of epilepsy must be done guardedly. You cannot give thyroid constantly as you would bromid, without endangering the balance of the internal glandular system and perhaps converting an epilepsy into, or even adding to an epilepsy, a glycosuria or an exophthalmic goiter, both of which contingencies have occurred. You cannot give a patient thymus, nor can you give a patient suprarenal gland, forever, without disturbing the same balance. You must give first one, then the other, or a third, or none. You may give one of the glands for a week; it may be necessary to give it for a month, but each patient must be the criterion of the treatment. And unless you do that you are bound to fail. Two points to show the close interrelationship between the endocrine glands and epilepsy might be cited, as follows: There is a seasonal variation in the epileptic attack. Seizures are always more severe and frequent in spring; also in the spring there is an increased thymus activity and an increased pituitary activity. Another point is that at those critical periods of life, such as the menopause, such as puberty, epileptics either are cured spontaneously or their troubles spontaneously get worse. And it is at just those periods also that the endocrine glandular system is called on to exert itself to its utmost. There is a parallelism, therefore, between disturbances in the endocrine gland system and apparent spontaneous changes in the epileptic seizures.

Dr. L. Kauffman, Buffalo, N. Y.: The question of calcium in the treatment of epilepsy has been touched on. Colloidal chemistry has a very strong bearing on the metabolic condition of the human body. Dr. G. H. A. Clowes, chemist to the New York State Cancer Institute at Buffalo, finds that there is a certain balance which the body normally maintains between calcium, on the one hand, and sodium on the other, and that as soon as you disturb this balance one way or the other there is trouble which may manifest itself in spasm, as tetany, etc., and epilepsy can likewise be considered one of the forms of disease ensuing. With Dr. James W. Putnam of Buffalo I have employed calcium with considerable success. Of course, we must first take into consideration elimination, the various causes of irritation must be removed, and all the other possibilities taken care of; if then metabolism is the factor, try calcium lactate. It is a better drug for the purpose than calcium chlorid. It does not irritate the stomach, and you can use 30 to 60 grains three times a day in a glass of water over a long period, but I think it better to use it over short periods. We have had favorable results and complete cures in cases so far studied.

Dr. George A. Moleen, Denver: In the treatment of epilepsy so many things have been advocated that conservatism and suspended judgment are demanded. The relation of hysteria to epilepsy is, I believe, showing a very perceptible narrowing of the gap. I would reserve my opinion of luminal, which has been used so largely in German clinics, because of its very close relative veronal, for we are seeing increasing numbers of habitués of veronal now. Therefore, it would seem that the same judgment should be applied to the use of luminal as would be applied to the routine use of opium.

Dr. F. X. Dercum, Philadelphia: I have been impressed by the consensus of opinion with regard to epilepsy, namely that epilepsy represents a multiplicity of conditions of which the convulsive seizures are merely epiphenomena. We should entertain clear ideas with regard to the principle of salt withdrawal as originally advocated by Richet and Toulouse. Salt is not of itself especially harmful to epileptics but during bromid administration salt withdrawal should be practiced as thoroughly as possible, for the reason that the bromid, in a measure, replaces the sodium chlorid in the tissues and is retained in the tissues for a much longer period than otherwise. In a case in which sodium chlorid has been withdrawn for some time and the sodium bromid freely administered, the sodium bromid will be eliminated rapidly in the urine when sodium chlorid is again taken, showing that there is an interrelation between the sodium chlorid and the sodium bromid in their retention and elimination. I could not, of course, in my paper enter into a discussion of the various other drugs which are being used in epilepsy. We are not infrequently forced to abandon the bromid and to try other remedies. I have also had a rather favorable experience with luminal. I have not, however, used it over very long periods of time because I have been afraid of establishing a habit. In regard to Dr. McBride's case, we all recall the fact that trauma, surgical operations and incidental infections, such as typhoid, frequently inhibit epileptic seizures for a greater or longer period. It would appear that the causes which modify the metabolism of the body for the time being influence the frequency of the

seizures. Operations on the intestinal tract, not infrequently performed at the present day, such as gastro-enterostomy, excision of the colon, etc., recall to our minds vividly the sad experiences of the profession years ago with regard to the influence that pelvic surgery was supposed to have on hysteria, epilepsy and other functional nervous diseases, an experience which should have convinced us as to the futility of such measures. Again, shall we experiment on our patients with poisons, autotoxins and what not, in diseases which are essentially morphologic and neuropathic in their character? Sanity demands that we should now and then review the knowledge which our ancestors and we ourselves have so painfully acquired in order that we should not allow ourselves to be deluded into wild and inexcusable undertakings.

THE PREPARATION OF THE PATIENT FOR OPERATION *

WALTER B. LANCASTER, M.D.
BOSTON

In discussing the preparation of the patient for operation, I wish to consider his mind, his body in general and his eyes in particular.

In preparing the patient for operation, we should aim to "rob surgery of its terrors" (Moynihan). This preparation must begin with our initial examination of the patient, our method of broaching the subject of operation, our sympathetic attitude toward his ignorant prejudices and fears. All this is as truly a part of the successful surgeon's training and equipment as his mastery of asepsis and other matters I shall soon discuss.

There is no one here but has himself felt the depressing effect of fear, dread, anxiety, worry, embarrassment and the stimulating tonic effect of hope, courage, faith, sympathy, religion, some one to lean on. Why do we not more systematically and deliberately set ourselves to utilize these facts?

In taking the history of the patient, special attention should be paid to previous operations, the anesthesia, convalescence, complications. If the patient has any idiosyncrasies it is important to know them.

GENERAL EXAMINATION

The condition of the circulatory, digestive, renal and nervous systems should be investigated with more or less thoroughness according to the nature of the operation and whether or not general anesthesia is to be employed. While the whole subject is open for discussion, I pass over syphilis, tuberculosis, alcoholism, pregnancy, heart disease and others for lack of time.

The importance of the digestive tract has always been recognized, but the more we learn about it the more important it seems to become. Free action of the bowels must be secured *and maintained*. In our desire to secure an empty colon, however, we must be careful not to so upset the patient as to do more harm than good. This is likely to happen now and then if a routine treatment is ordered for all patients without individualizing. Often it is well to order the treatment — cathartics or enema — not the day before but two or three days before the operation so that if any undue disturbance is created it may have passed off before the operation, and if the treatment has not been effective it may be repeated.

Too great zeal in preparation, too many baths and enemas and purges and dieting tend to induce a state of nervousness in a person, especially if elderly, who is entirely unaccustomed to such procedures and to whom they are very distasteful. In these cases the mental preparation is often more important than the physical, and the patient should be brought to the operation with the minimum deviation from his established daily mode of life. Not a few of these patients do better when operated on in their own homes; but the work and anxiety of the surgeon are greatly increased and there are other obvious disadvantages, so that on the whole a hospital is the best place. Sudden changes in the patient's habits or mode of dress are to be avoided, for example, giving the patient a warm bath and then putting on cotton night clothing when the patient has been wont to wear flannel; shampooing the hair against the patient's wishes, or having the windows open more widely than is the patient's custom. What though the patient's habits have not been up to the latest hygienic standards, this is no time to reform him! Let us get him through his operation and convalescence as quickly, safely and comfortably as possible.

NOSE AND MOUTH

The nose and mouth are but little less important than the colon. It is difficult in any particular case to trace trouble with the healing of an eye to foci of infection about the teeth or tonsils or sinuses because so many thousands of patients have these foci who do not present pathologic results in the eye.

I believe that most of the mild cases of uveitis following cataract or similar operations are due to slight infections from the operation. Some are noninfective, but due to the toxic action of lens material. (This is denied by Treacher Collins.) Some of the slightest and most evanescent are due to trauma pure and simple; but it is becoming more and more clear that a fair proportion must be ascribed to the same causes as uveitis in nonoperated eyes, namely, to foci of infection in other parts of the body. An operation like any other trauma is just the determining factor needed in such cases to enable the pathologic influences, already at work, but till then ineffectually, to start up the inflammatory process. It matters not whether these foci of infection act through their toxic chemical substances, or, as seems more probable, through the micro-organisms themselves.

When the anterior chamber is evacuated, there is a great increase in the flow of fluids through the eye. Thus if fluorescein is injected into the general circulation, none may appear in the anterior chamber or eye; but if paracentesis of the cornea is done, staining may quickly follow. This is of great importance as showing how the antibodies and protective materials are carried to the wound when the anterior chamber is opened. Probably many eyes could be saved by a more frequent use of this means of bringing up reinforcements. Sometimes it may be well to open the anterior chamber not only daily but several times a day in combating severe infection. It is beneficial also as a means of drainage. On the other hand, it seems probable that this same enormous increase in the flow of currents through the eye may serve to bring deleterious agents, whether chemicals or organisms, to the

* Because of lack of space, this article is abbreviated in THE JOURNAL. The complete article appears in the Transactions of the Section and in the author's reprints.

* Read before the Section on Ophthalmology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

eye in too large amounts, and so an endogenous infection may be set up which otherwise might never have occurred, although there was a focus of infection somewhere all the time.

The bearing of this on the preparation of a patient for such an operation as cataract is obvious. We should eliminate as far as possible all foci of infection, which, if circumstances should be favorable, might cause an iritis. The mouth and teeth should be cleaned up in the surgical sense. The tonsils and sinuses should be cared for.

I wish to call particular attention to the possible danger of these foci of infection to the patients with the thin conjunctival "bleb" which so often follows sclerocorneal trephining. I believe that some of these tragic late infections could be traced to suppurating ethmoids, bad teeth or the like.

ARTERIOSCLEROSIS

Arteriosclerosis interests us chiefly because it is often the important factor in intra-ocular hemorrhage. It acts in two ways: by the high blood pressure and by the weakened vessel wall. The healthy blood vessels have a wide margin of safety in their strength to withstand pressure, but endarteritis and endophlebitis greatly reduce this margin.

The intra-ocular pressure tends to support the arteries and veins, so that the vessel walls do not sustain the whole of the blood pressure in them. When the eyeball is opened, all this support is removed quite suddenly, and so the whole of the blood pressure has to be borne by the vessel walls practically unaided.

It is obvious that we have two ways of avoiding this sudden increase in tension on the walls of the vessels produced by opening the eyeball. We can reduce the pressure in the vessels and we can reduce the pressure in the eye.

The pressure in the eye can be reduced in cases of glaucoma, by miotics vigorously pushed and aided by ethyl-morphin hydrochlorid (dionin) and cocain and ocular massage. Rest in bed with light diet and purgation are important aids, and some sedative to subdue nervous excitement and anodynes to relieve pain are obviously indicated. In case of acute congestive symptoms, leeches will help. When one cannot take the time required to reduce intra-ocular pressure by these methods, or when they are ineffective, one can and should tap the vitreous by scleral incision, permitting slow escape of some of the contents of the eyeball.

Where intra-ocular hemorrhage is to be feared, reduction of blood pressure is even more important than reduction of intra-ocular pressure, unless glaucoma with high tension is present, when both should be reduced.

In the reduction of the general arterial blood pressure the following are the chief resources at our disposal, and we may wisely invite the cooperation of the internist in their selection and use, for arterial hypertension is sometimes compensatory, in which case it is not ruthlessly to be interfered with; while if it is due to the presence of toxic products, the result of faulty mode of life, it should be remedied, of course: rest in bed, say a week before operation, if not contraindicated; milk and farinaceous diet restricted in quantity; mild purgatives; mental respose; sleep (blood pressure usually falls in sleep, often from 30 to 50 mm.); enteroclysis; avoidance of what puts increased demands on the kidney and therefore on the circulation, as salt, alcohol, gravies, soups, extractives, or too much water; hydrotherapy; warm baths; electric light baths; massage with Swedish movement; phlebotomy, not less than from 300 to 500 c.c. Nitrites are especially valuable when a prompt effect is wanted, even if it is only fleeting. Thus nitroglycerin, $\frac{1}{100}$ grain, may be given every fifteen to twenty minutes until some effect is produced which either satisfies our requirements or is a signal to stop.

As to general anesthesia, ether does not alter arterial tension much. Nitrous oxid increases it.

In a case in which immediate operation is required, the arterial tension can be lowered quickly by nitrites, or failing that, by phlebotomy; the intra-ocular pressure can be lowered by cocain and massage, or if necessary, scleral puncture; but this must not be so done as very rapidly to reduce the ocular tension, or intra-ocular hemorrhage will be quite as likely to occur as on opening the anterior chamber.

PREPARATION FOR ANESTHESIA

I pass over the well known precautions as to the mouth, stomach and intestinal tract. If narcosis is to be used, there is a difference of opinion as to the use of morphin. It is the belief of a majority that a hypodermic of morphin shortly before the beginning of the narcosis will make it easier for the patient and for the anesthetist. To secure a good sleep the night before, adalin and veronal, or bromid and chloral may be used, and if necessary may be repeated the morning of the operation to subdue nervousness. This preparation is important when a general anesthetic is to be used; for local anesthesia it is indispensable.

It is not desirable for the patient to be too thoroughly doped in preparation for muscle operations or other operations on the globe, for we want the patient's cooperation. One should try to secure such a dosage of the sedative drugs as will produce freedom from worry and undue dread, without anything approaching stupor.

EXAMINATION OF THE OTHER EYE

That an examination of the physical condition and functions of the eye should precede operation hardly needs to be emphasized. One thing should never be omitted before any operation, and that is to learn the condition of the other eye. If that is useless or nearly so, one should consider well the serious responsibility he assumes in operating on the only good eye.

THE SKIN

For the preparation of the patient's skin we have two approved methods:

1. Wiping with a cotton sponge, moistened with benzin (this is especially good for the lashes), washing thoroughly with soap and water followed by mercuric chlorid, 1:1,000, drying, and applying alcohol.

2. Application of tincture of iodin to the dry skin (previous washing reduces the efficiency of this method), which is valuable for quick preparation in an emergency. The lids may be irritated by iodin, causing itching or even eczema with vesicles, etc. Hence many have either given it up for regular use or reduced the strength to one half. Fresh tincture is less irritating than old. Eyebrows, if long, may be plastered down with collodion, as suggested by Elliot. (In extensive plastic operations they should be shaved.) Lashes should be clipped short where they are likely to be touched by instruments. If a speculum with a blade covering the lashes is used, only the outer fourth of the lids needs to have the lashes cut.

If an ordinary speculum is used, all should be cut. Elliot points out that the lashes should be cut sufficiently short with the first stroke of the scissors, since short, stiff fragments cut off with the second cut are hard to get rid of and very irritating to the conjunctiva. If the scissors are anointed well with sterile petrolatum, the hairs will adhere to them as they are cut.

LACRIMAL SAC

The lacrimal sac requires most careful examination. Pressure will not always squeeze out anything from a diseased sac, for it may have been squeezed shortly before the examination, or it may be so protected by the anatomic conditions and small size of the sac that nothing is pressed out. A safer and surer way is to syringe through the lower canaliculus with a syringe whose tip is small enough to enter the punctum after it has been slightly dilated, but not cut. Liquid should run through without forcing. A partially obstructed lacrimal duct is dangerous as well as a completely stenosed one. Argyrol or fluorescein instilled in the conjunctiva should appear in the nose within ten minutes. Usually it is sufficient to have the patient hold the head forward ten minutes and then blow the nose into a piece of gauze. If this is negative, to make sure, a small wad of cotton should be placed in the inferior meatus close to the lower end of the duct and a second instillation made. It is possible for argyrol to work its way through a passage too small for free natural drainage of the sac and as Duane has pointed out, this is a method of overcoming an incipient stenosis by treatment without probing. Frequent instillation of argyrol may reduce swelling and clean out the duct and restore free drainage. Unless one is fully convinced that the lacrimal sac and duct are free from obstruction and disease, he should not omit syringing, and if still suspicious, the canaliculi should be tied by a suture passed around both a few millimeters to the nasal side of the puncta, and the puncta may be seared with a pointed cautery. After a week when the wound in the eye has healed, the stitch may be removed, and if the puncta were seared they may be opened again with a suitable dilator.

There is another condition which requires suture of the canaliculi, or sealing of the puncta by cautery, and that is the presence of a dangerous condition in the nose, as ozena or ethmoiditis.

When the duct is definitely stenosed, a brief course of treatment may be tried; but if a very few probings and syringings do not secure free drainage into the nose, the sac should be extirpated. This is the safest treatment in most cases. The immediate result is an increase in the bacterial content of the conjunctival sac so that it is not wise to operate for two or three weeks, during which time treatment to improve the conjunctiva and reduce the number of bacteria should be carried out.

CONJUNCTIVA

All investigators are agreed that since instruments, sponges and collyria can be surely sterilized and hands can be kept away from contact with the operative field, the great source of danger is the conjunctival sac. Most postoperative infections have their origin in the conjunctiva.

We have a peculiarly intricate and difficult problem, then, for not only are organisms always present, often of dangerous varieties, but if they are ignored, only 5 to 6 per cent. of eyes will suppurate, as in preliisterian days. It is not like an operation on a knee joint where any departure from strict asepsis is almost sure to be followed by disaster. Disaster in eye operations comes in only a small percentage of cases, even with very loose and unsurgical methods of asepsis. Finally, the best operators are not in agreement as to the best methods of ocular asepsis.

There are three schools or methods which are supported by sufficiently good authority and argument to command our study:

1. Method chiefly urged by Elschnig of Prague, Axenfeld of Freiburg, and Browning of London.

Before any cataract or similar operation, cultures of the conjunctival sac are made by instilling a special culture fluid into the sac and sucking it up again with care to avoid contamination with the lid margins; incubation is carried on for twenty-four hours; a stained smear is examined, and if streptococci or staphylococci or other dangerous organisms are present, operation is postponed till suitable treatment has, if possible, eliminated the unwelcome organisms. If no dangerous organisms are found, operation may proceed. This will be in about 70 per cent. of the cases. If the appearance of the conjunctiva is suspicious, one should wait more than twenty-four hours until the culture has incubated longer.

2. The Vienna method of Fuchs and his followers.

One decides whether or not it is safe to operate by the clinical appearance of the conjunctiva. If that appears clean and safe, the operation may be done at once. If not, treatment should be given until the pathologic conditions are remedied. Cultures are misleading. The eye is prepared at the operation by the operator himself. The skin is wiped with cotton moistened with benzin, followed by washing with a special soap and 1:1,000 mercuric chlorid. The conjunctival sac is wiped with swabs and then irrigated forcibly. If the eye is of the class called clinically clean, normal salt is used for the swabs and irrigation. If it is regarded as suspicious, mercuric oxycyanid, 1:2,500, is used for the swabs and irrigation.

3. Indian method advocated by Herbert and Elliot.

In the presence of active infection, operation is postponed until this has been remedied (for example, the lacrimal sac is extirpated). To determine the presence of active conjunctivitis, a test bandage is used. If this shows no significant discharge, even if the conjunctiva is thickened, rough and diseased, the operation may be safely done, provided the following method is carefully carried out: Fifteen minutes before operation the everted lids are irrigated with 1:3,000 mercuric chlorid under a head of 3 feet, moving the lids vertically so the stream will penetrate all folds and especially around the caruncle and fornices. Irrigating is continued at least a full minute and longer if the desired result is not obtained, namely, secretion of grayish mucus; or if the mucous membrane is so scarred that this does not occur, until clouding and opacity of the epithelium from superficial coagulation necrosis occurs. This is followed by epinephrin to control the hyperemia, and then cocain at intervals for fifteen minutes. If insufficient effect was produced, it will show now by absence of mucus or opacity, and further irrigation with mercuric chlorid may be done, but usually at this stage irrigation with normal salt will suffice. Elliot adds at this point, before irrigating with saline, wiping of the conjunctiva with sterile swabs, moistened with saline.

We may be guided in our choice between these methods by the statistics of series of cases treated by the different methods, or by the arguments and theories advanced in support, and finally by our own experiences and prejudices.

The results of the Indian method of prolonged irrigation with 1:3,000 mercuric chlorid are far superior to those of the other methods. Herbert's last 1,655 cases were free from panophthalmitis, and there were only two cases of iritis severe enough to close the pupils.

After Elliot was induced to adopt this method by seeing the remarkable results obtained by Herbert, he had one suppuration in the first thousand cases (due to an undiscovered suppurating tear sac). Since then he has had thousands without a suppuration. Herbert and Elliot say that suppuration has been practically eliminated since they adopted this method and perfected other details. Even nonsuppurative inflammations are very rare. Moreover, the conditions under which these operators worked, and the class of patients, were both less advantageous than are found in Europe and America.

Other Indian operators have followed similar methods, and if statistics have any meaning, their results must carry great weight. The enormous numbers of cases in which operations were performed under fairly uniform conditions make the statistics peculiarly convincing.

Statistics of Fuchs' clinic as reported by Lindner[1] show results varying with the skill and experience of the operator from one suppuration in 509 cases, or two in 664 cases, down to four in ninety-five cases during the same period of time and with the same methods. It is evident that the Fuchs method makes use of the swabs and irrigation with mercurial lotion similarly to Elliott, only less prolonged and using oxycyanid instead of mercuric chlorid and limiting the mercurial to the suspicious cases. Now it has been abundantly shown that cases which clinically look clean may harbor dangerous organisms. Washing with normal salt solution will mechanically remove many, but if mercurial is regarded as safer when dangerous organisms are thought to be present, why not use it when it is not known that they are absent? The far better statistics of Elliot, Herbert and other Indian operators would seem to show that they are nearer right in their method.

Let us look at the statistics of those who use the bacteriologic findings as a guide to operation. From Elschnig's clinic there is reported a series of cases with 0.5 per cent. failures and 3.5 per cent. iritis (of which 1 per cent. is classed as bacterial and 2.5 per cent. abacterial).

From Moorfield's, Browning[2] reports "only one case of infection in all the operations where the bacteriological examination has been made and the eye reported suitable for operation, and no case of acute postoperative infection has occurred after cataract extraction." Browning's method of examination is by carefully applying a sterile swab to the conjunctiva of the eye to be examined and with this inoculating human blood agar, incubating twenty-four hours or more and examining stained smear. Previously to the adoption of this technic, about 1 per cent. of the eyes operated on for cataract at Moorfield's were enucleated because of infection. In fact, anything less than 2 per cent. of infections has been considered good in the past, but that standard will have to be raised.

If dangerous organisms are found, various methods are advised to get rid of them. At Prague, according to Kraupa,[3] they use irrigation every half hour with 1:5,000 mercuric oxycyanid and wash out the tear passages daily. On the third day another culture is taken (he does not say for how many hours irrigations are omitted before taking this), and if positive, 1 per cent. silver nitrate is applied, even if there is no secretion from the conjunctiva. Ethylhydrocuprein, 0.5 per cent., is used also in some cases for half hourly irrigation. If he has to operate before the sac shows negative cultures, he applies silver nitrate, 1 per cent., two hours before operation and copious irrigation at the time of the operation with oxycyanate, avoids bruising the wound, uses conjunctival flap, and avoids introducing into the eye any instrument which has touched the surface of the eyeball; but he does not think it necessarily an indication for iridectomy. He thinks it particularly important to know about the bacterial content of the conjunctival sac in cases of needling or treating prolapsed iris.

In Vienna, if the conjunctiva looks unclean and the cultures are positive, the treatment, according to Lindner,[1] is 2 per cent. silver nitrate once daily, and he reports great difficulty in getting negative cultures in these cases.

At Moorfield's, Browning[2] says no treatment will so surely and quickly render an eye sterile to cultures as mercuric chlorid, and so if a culture is taken less than twelve hours after irrigating with this it is likely to be sterile, though a few hours later, if untreated, it would be positive. This is a very important point, and may be the cause of some of the failures by other operators. I suppose the reason for this is that the pathogenic bacteria are not only on the surface of the conjunctiva, but also are in the ducts of the glands which abound there. The antiseptic solutions do not penetrate into the ducts, and though nearly all those on the surface may be removed or rendered harmless, fresh ones gradually come to the surface from the glands, just as happens when we try to sterilize the skin, for example, the hands.

Mayou says that over and over again he has found the conjunctiva almost invariably sterile when tested after three days, washing four times a day with perchlorid 1:6,000.

It is probable that some of the energetic measures adopted to get rid of the organisms only serve to keep up or set up a conjunctivitis, because they are so strong and irritating. One of the advantages of argyrol is that it is not irritating; another is that it penetrates on account of its great specific gravity. It seems to me that 25 per cent. argyrol instilled every hour, and copious irrigation with a weak mercuric chlorid or oxycyanid solution 1:5,000 twice a day, for half a minute or less, according to the amount of irritation excited, is more likely to be well borne by the conjunctiva. We must rely largely on Nature's defenses, and it is unwise to break them down by too vigorous use of powerful antiseptics. I should not use silver nitrate if there is no conjunctivitis.

In view of the conflicting opinions among the highest authorities, it is not well to be dogmatic; but I venture to make a definite statement as to what seems to

1. Lindner: Arch. f. Ophth. (Graefe's), 1914, lxxxviii, 415.
2. Browning: Tr. Ophth. Soc. U. Kingdom, 1914, xxxiv, 61.
3. Kraupa: Ztschr. f. Augenh., 1913, xxx, 459.

me the best procedure in the hope that it will stimulate discussion.

1. A knowledge of the bacterial content of the conjunctival sac is of very great value to an operator, provided it is reliable. At present such information is not obtainable anywhere in satisfactory fulness. It is not enough to be told that streptococci are present, or even that pneumococci are present. There are an unknown but large number of different varieties and types and strains, differing in virulence, differing in the immune reactions they excite, and consequently requiring different defensive antibodies for the patient to combat them with. But the fact that perfectly full and reliable information is not available is not a sufficient reason for rejecting the partial information that is within our reach. Let us seek for all the information we can get, and keep clearly in mind its limitations. It is only a question of time when much fuller information will be obtainable. It does not seem unreasonable to prophesy that when the strains of streptococci are differentiated, vaccines and serums will be found far more effective because applied so much more intelligently than at present is possible. I would make for my first thesis the assertion that it is desirable to have as full a report as possible on the bacterial content of a conjunctival sac, before undertaking a cataract or similar operation.

2. Since our laboratory report is confessedly not to be fully trusted, we must apply the clinical test. If the conjunctiva is not healthy looking, operation should be postponed until treatment has made such improvement as is possible in a reasonable time. If it is healthy looking and the laboratory report is not unfavorable, the operation may be proceeded with.

3. The best treatment for the conjunctiva when not healthy, or when the bacterial report is unfavorable, will vary with the condition and the organism. Three aims should be kept in view: (*a*) To remove mechanically all bacteria as fast as possible by free drainage and irrigation. (*b*) To increase the natural resistance and defensive powers of the eye and body. (*c*) To kill or inhibit the growth of the bacteria. For *a*, instillation of argyrol 20 to 25 per cent. every hour has proved its value, though it is said to have no value as a germicide, so that care should be taken that its solutions are sterile. This should be supplemented by copious irrigation twice, or perhaps many more times a day with a mercurial lotion, either mercuric chlorid or cyanid, 1 : 5,000, but I should not favor the frequent application of strong antiseptics or irritants. Yellow mercuric oxid ointment, or other antiseptic ointments are often useful. There may be, and probably are, special antiseptics of value against special organisms, as zinc solution against the diplobacilli and ethylhydrocuprein against pneumococci. Where the mercurials are irritating and seem to do more harm than good, I like to use a bland, but very cleansing and agreeable lotion containing:

	gm. or c.c.
Boric acid	0.8
Borax	8.8
Ol. eucalypt.	0.15
Ol. gaulther	0.15
Menthol	0.050
Thymol	0.075
Water	1,000.

To increase the general and local resistance, attention to the digestive tract and to diet, fresh air (avoiding wind, dust, smoke and strong light) exercise and plenty of sleep should be prescribed. In short, eyes and body should be put in the best physical condition possible. There is no doubt that in suitable cases vaccines and antiserums are of value, but their limitations are not yet well defined.

Lastly, if one is obliged to operate, or chooses to operate in the presence of an unhealthy looking conjunctiva or with positive cultures of dangerous organisms, the most effective plan is that of Herbert as modified by Elliot. I am not sure that cotton swabs are the best to aid the irrigation in clearing away the bacteria. A smooth glass or metal or rubber instrument may serve the purpose as well, and be less likely to leave lint behind. The objects to be gained by the swabbing are removal of mucus, etc., and also by a sort of massage the removal of some of the contents of the conjunctival glands, which might otherwise be made to escape during the operation by the similar massage by the lid elevator or other instruments or fingers.

SQUEEZING

Is there anything that can be done to prevent squeezing? Maddox[4] speaks of the dozens of eyes that are spoiled annually in his country, by sudden squeezes which overpower the ordinary speculum. The same is true in ours. Much thought has been given to this problem, and the chief reliance of ophthalmic surgeons is on one or another method of procedure during operation aimed to control rather than prevent squeezing — special forms of speculum or blepharostat, or special ways of holding them and supplementing them with fingers. Of these we need not speak, for they are not a part of preparation of the patient for operation.

Van Lint has suggested prevention of squeezing by paralyzing that part of the facial nerve which controls the orbicularis. He does this by deep injection into the outer half of the upper and lower lids through one puncture external to the outer canthus. The solution is from 3 to 4 c.c. of 1 per cent. novocain with some suprarenin. He operates from one-half to one hour after injection. How well this succeeds I do not know.

Other operators try temporarily to rob the orbicularis of its power for mischief by cutting the muscle or its tendon. An incision upward and outward through the muscle above the external lateral ligament will quickly heal while the operative wound in the eye is healing and will leave no noticeable scar. One of the chief advantages of this method is the better access gained in case the palpebral fissure is small. This cut allows the lids to be more widely opened. It should be more often used.

Maddox[4] recommends a suture for bad cases to be inserted before the cataract incision is made. It passes across the cornea from the insertion of the superior rectus to a point below the cornea. This is not preventive of squeezing, but is aimed to hold the wound together when the patient squeezes, being slackened during intervals of comparative calm, to allow the necessary steps to be taken.

All these measures, except the last, are aimed to control or prevent squeezing by the orbicularis. They take no account of any other method the patient may have of squeezing. I believe that the orbicularis is far the most important factor in squeezing, but I am convinced that the external ocular muscles are capable of exerting pressure and do exert pressure if they are caused to contract, and I am not referring now to the

4. Maddox: Ophth. Rev., October, 1914, xxxiii.

well known effect in pulling open the wound and at the same time exerting pressure on the globe, which is caused by contraction of the inferior rectus and superior oblique muscles when the patient is told to look down and does so. Smith has shown how this may be avoided by operating with the patient looking up, and his contribution is of no little value.

I wish to call attention to an old but simple way of greatly reducing, though not wholly preventing, squeezing. Squeezing is a reflex act which a patient with intelligence and self-control can inhibit. But a reflex act requires a centripetal impulse to the nerve centers to start it — a sensation. If we can arrange to eliminate that, we shall not have to avail ourselves of the various methods of increasing the patient's inhibitory control, nor shall we have to resort to paralyzing or cutting the orbicularis. To avoid this centripetal impulse, this exciting sensation, we have only to avoid doing things to the eye that the patient can feel. In short, I wish to make a plea for thorough anesthesia and gentle and skilful manipulation. The experienced and dexterous operator has far less troublesome patients apparently, but that, of course, is because he does not excite them to troublesome demonstrations, knowing as he does how to execute his manipulations without setting up the annoying and dangerous reflexes. But apart from the question of skill, I am sure that more complete anesthesia would be the salvation of many an eye. Cocain instilled in the conjunctival sac produces only analgesia in a large proportion of cases, not anesthesia, and when it comes to manipulation of the iris, not even analgesia is always obtained.

I need not describe the various methods of securing anesthesia for cataract or similar operations. Prolonged use of cocain in strong solutions is harmful, so much so that some advise operating within ten minutes of the first instillation of cocain. Yet others instill cocain repeatedly for half an hour, or holocain and cocain; others inject cocain subconjunctivally near the site of the incision, even as high as 15 per cent. strength. Some allow some cocain solution to run into the anterior chamber before doing the iridectomy, or even place a crystal of cocain on the iris. Very few avail themselves of another method which is easy and has not yet, so far as I know, been shown to be dangerous, and that is the production of a profound anesthesia of the eyeball inside and out, by injecting novocain solution about the posterior pole of the eyeball so as to reach the ciliary ganglion or ciliary nerves. Pooley of Sheffield speaks of the total absence of squeezing or other reaction when doing anything to the iris in cases in which he has used this method. Is it safe? Only a more extended use can decide that question. I believe its possible dangers are much overrated. I have never seen any bad effects, but my experience does not cover enough cases to prove anything.

522 Commonwealth Avenue.

ABSTRACT OF DISCUSSION

DR. W. H. WILDER, Chicago: The method of preparation of a patient will vary considerably with different operators according to their fondness for certain procedures. Speaking broadly, we should endeavor to conceal from the patient as much as possible the elaborate preparations that are made in his behalf and thus spare him the anxiety and mental shock that such knowledge might excite. It is not wise to explain to the patient too fully what is to be done; in some cases, in fact in most, it would only result in confusing or frightening him. I think I can agree with Dr. Lancaster in most of his premises. Whenever the eyeball is to be opened or entered with an instrument, the utmost care should be taken in the examination of the conjunctival sac for bacteria. If pathogenic organisms are found, operation should be deferred until the conjunctiva is free of them. While it seems that one may safely operate in the presence of such organisms as *B. xerosis* or *Staphylococcus albus*, it should be remembered that certain strains of *S. albus* may be more virulent than others, and certain colonies that appear white at first may develop the orange color in a few days that betrays their greater virulence. As a means of combating organisms in the conjunctival sac, I have used for several years, following the suggestion of Elschnig, oxycyanid of mercury in solution of 1:5,000. It seems to come into more intimate contact with the membrane and accomplish the desired result more promptly and with less irritation than the bichlorid solution.

I have often been asked by students and others why I do not use gloves when operating for cataract or iridectomy, and it is necessary to explain that one's tactile sense is somewhat obtunded by them, and there is no reason why the surgeon's fingers or any part of an instrument he has touched should come in contact with the field of operation. The hands of the assistant who prepares and uses the sponges, however, should be in gloves.

DR. WALTER H. SNYDER, Toledo, O.: A few years ago two patients with cataract came for operation, one of whom admitted he had lost the other eye by squeezing and the other was a patient who was fearful and worried, as she had friends who had been operated on with unpleasant results. Neither patient was a good surgical risk for general anesthesia. I adopted the method used by general surgeons in thyroid surgery. My cataract cases are always operated in bed. The two patients were brought to the hospital and told they would not be operated on for some days. The first afternoon at five o'clock a hypodermic of morphin was given, then cocain was instilled, and speculum inserted, eye flushed out, and 1-grain solution of silver nitrate applied for the slight conjunctivitis. This permitted me to note their reaction to the morphin, allowed them to become familiar with the speculum and the usual directions. The next day at the same time the patient was put to bed and the same technic gone through except that normal salt solution was used instead of morphin. They were trained to look in the various directions, to close the lids easily and keep them closed, and cautioned against holding their breath (which sometimes begins the cycle of a squeeze). The suggestion was given that they would sleep after the injection and this was fortified by the fact, unknown to them, that morphin was used the first time but salt the second. They were allowed to lie in bed with a Ring mask on during the night. This did not provoke any irritation of the lids, as no cotton was used. In a few days they hardly noticed what was being done, and in four or five days I operated on them without telling them that I intended to do anything different than the usual dressing. However, the day the operation was done morphin was again used. Fifteen such patients have been operated on in the last two years with the most satisfactory results, seven being one-eyed patients who had lost the other eye from squeezing, vitreous loss, etc. This takes considerable time, but I feel that is of little moment when the results are considered. It seems to me that patients practically suffer no pain during a cataract operation but they act badly as the result of fear. The application to the eye is original with me but Dr. Crile uses a somewhat similar technic in his thyroid cases.

In a certain type of early cataract depending on a uveitis I have found it useful to have provocative treatment with mercury for a few weeks before the Wassermann, and the results in these cases after operation convince me that many of the cataract patients who do so badly are syphilitics needing only the trauma of an operation to set up a uveitis that cannot be controlled in time to save the eye.

DR. H. S. GRADLE, Chicago: Irrespective of how much weight we lay on exact knowledge of the bacterial content of the conjunctival sac before operation, I think we are all agreed that it is one of the important factors. There is only

one safe method of determining this bacterial content, and that is by the use of a culture. Smears will not give the content of the sac in 50 per cent. of cases where there are pneumococci or streptococci present. To get a complete record, we must use either a fluid culture medium or else take some of the tears, or salt solution dropped into the sac after the lids have been allowed to close, thus spreading the fluid in the depths of the transitional folds, and sweeping up the organisms present. If a loop is used, one can obtain only the superficial organisms from the tarsal conjunctiva. The majority of organisms are not in this region, but are in the depths of the transitional fold, and it is only by the use of fluid mediums that we can obtain them. Serum bouillon gives better results than any solid culture medium.

MALCOLM C. ROSE, New York: We are fighting a drug epidemic in this country. We do not have to mention drugs before the public. The Wassermann fails in a great number of the older cases of syphilis. It is only absolutely reliable in cases of about one or two years' standing. A test found effective by a number of men in the old cases of syphilis is the luetin test. Before using the test you must be informed on one point: Has the person been taking potassium iodid within a month? If so, the luetin test will show a reaction similar to that in syphilis.

DR. J. A. DONOVAN, Butte, Mont.: Dr. Lancaster's suggestion to reform the general hygienic customs of the patient within twenty-four hours is a capital one. As to opening the anterior chamber, formerly in many cases when in doubt I did not open it; now I give it the benefit of the doubt and open the anterior chamber, and I am usually glad of it. As to antiseptics, I have been using the biniodid in solutions and ointments, 1:5,000. I have increased the strength of the ointment to 1:1,000. It is made by dissolving the mercury in a potassium iodid solution, rubbing this into adeps lanae and petrolatum. After a traumatism it can be used in this strength without any irritation and it has many advantages.

DR. A. S. GREEN, San Francisco: Smith of India does not use the same method as used by Herbert and Elliot, and he gets as good results as they do. His infections do not run over one half of 1 per cent. All he does is to irrigate the eye when the patient is on the table with 1:2,000 mercuric chlorid solution, taking care that the lids are sufficiently lifted from the globes so that the fluid will go underneath into the culdesac. He does not use a test bandage before the operation. He puts 0.5 per cent. yellow oxid ointment over the fissure after operation. In regard to instructing the patient beforehand, too much teaching of the patient may prove very troublesome, and that it is not necessary is shown by the methods and results of Smith. His patients come in probably the day of the operation; he likely has never seen them before, and without any preliminary instruction of any kind he operates on them, very seldom saying a word to the patient during the operation. The more talk the more nervous one is apt to make them. In this country we use a scheme to demonstrate to the patient that there will be no pain. That is, we utilize the time when we take the intra-ocular pressure with the tonometer to call attention to the fact that though we touch the cornea there is no sensation. It is probably true that most eyes that are lost from loss of vitreous are lost on account of squeezing. I do not believe it is necessary to resort to all the means spoken of by Dr. Lancaster to prevent squeezing. By the use of a speculum with a handle, the lids can be removed from the eyeball entirely so that no pressure will result. The speculum will prevent squeezing at the time of the incision and during the iridectomy, and that is the most dangerous period. It is on completion of the incision that the loss of vitreous generally occurs. But in some eyes the speculum will not answer as well for the delivery of the lens as a large strabismus hook. To safeguard the eye it is not sufficient to use the ordinary speculum, or to hold the lids with the fingers, as I have seen loss of vitreous time and again. Another point to guard against during the incision is the interference of the lashes. I have seen many good operators who made sufficient preparation, nullify the effect of that preparation by sweeping the knife through the lashes. If they would trim the lashes that danger would be obviated.

DR. WENDELL REBER, Philadelphia: All those who have operated to any extent will agree with me that the tranquil patient is the greatest assurance against operative accident. Formerly I used morphin and atropin. Its disadvantage is that it produces postoperative vomiting, which, of course, is the most formidable complication we have to deal with. For the last five years I have followed the following plan: Two and one-half hours before the operation the patient receives 20 grains of bromid and 10 grains of chloral. An hour later he receives a similar dose. A half hour before the operation the patient receives $\frac{1}{6}$ grain morphin and $\frac{1}{200}$ grain of atropin hypodermically. I have not had vomiting in one case. I generally operate between 2 and 4 in the afternoon. I have an absolutely quiet patient. I have seen some vitreous loss in two cases. This method of preparing the patient is the most valuable I have ever employed.

DR. CLARK W. HAWLEY, Chicago: My operative experience may be divided into three periods. In my first few years I used mercuric chlorid in all operative work, and I had good success; a middle period when I tried things suggested by various men whom I thought better than myself. I had good success. My last and latest method is the simplest of all. I have learned to let the new suggestions be carried out by other men. In my cataract and other work I use as little manipulation as possible. My success in the later period is just as good or better than it was before.

In Europe I saw one operator who in all his work used nothing but the tap water of London. I saw him do 400 operations twenty-five years ago, and in his first series of 400 he had about eight losses; in his second series he was then having about the same proportion. Another operator used all the antiseptic precautions advocated in those days, and his loss was from 16 to 25. So that I believe if you can get a system adapted to your own individuality and make it as simple as possible you will have better success than by attempting to employ all the new notions various men may give us. I should like to call attention to one thing in regard to squeezing, and that is always to cocainize the other eye as thoroughly as the one on which you operate. That is especially valuable in children. Another suggestion is as to the use of a strabismus-hook. I have a better instrument in our common lid-elevator.

DR. LEE M. FRANCIS, Buffalo: I have found it useful to substitute for the morphin, codein phosphate in half-grain doses, and I have not had to deal with vomiting. While I have used chloral and the bromids, I think one gets the best effect with the least disturbance by giving it per rectum.

DR. M. FEINGOLD, New Orleans: For the prevention of intra-ocular hemorrhage subsequent to operations that open the eye, a method I believe advocated by Gilbert of Munich ought to be mentioned. It consists in performing venesection on the patient prior to operation. I have done this in several instances in which one eye has been lost by intra-ocular hemorrhage following an iridectomy. The results were excellent.

Another suggestion to prevent intra-ocular hemorrhage after operation was made by Hertel of Strassburg. His experiments based on Fisher's theory of glaucoma showed that introduction of large doses of chlorid of sodium into the general circulation would produce a tremendous fall of the intra-ocular tension that would last a few hours. These experiments he repeated on the patient with excellent results as to tension and without any disturbance as to the general condition.

Regarding the treatment immediately after the operation, I should like to mention the following: Some years ago I adopted the method of applying mercuric chlorid ointment or petrolatum only to the lids after operations and recommended it to my friends. A short while after I was present when a secondary cataract operation was about to be performed, and I noticed that something yellow, thin and flat was floating in the patient's anterior chamber and always occupied the highest point as the eye moved around. I at once concluded that the substance must be petrolatum that had entered the anterior chamber after the first operation when the patient had squeezed his lids under the bandage.

The petrolatum was easily removed from the anterior chamber by paracentesis. Since that time I have abandoned the use of ointments.

Dr. Walter B. Lancaster, Boston: In regard to the preliminary training of the patient, I think that it is useful in some cases and harmful in others. Like a good many other measures, it ought to be used by individualizing the patients. Some will be made more intractable the more you try to train them. Many patients may seem to be calm and say they have no fear. Often in such cases the pulse is the better guide. Some of the professional anesthetists call attention particularly to this danger with athletes. They need special care in preliminary treatment, and often require sedatives. An important point to observe in the operating room is not to converse. These patients hear and whether they understand correctly or not, put their own construction on what they hear.

THE TRANSPLANTATION OF DUCTLESS GLANDS

WITH REFERENCE TO PERMANENCE AND FUNCTION *

O. T. MANLEY, M.D.
WARREN, OHIO
AND
DAVID MARINE, M.D.
CLEVELAND

The transplantation of normal or tumor tissue is at present attracting wide interest among experimental physiologists and pathologists because of the many fundamental biologic problems which earlier work, both with tumor and normal tissue, uncovered. Among these problems probably the two that are being most actively investigated at present are (1) whether specific nerves (either secretory or regulatory) are necessary for the survival, growth and function of transplanted tissues, and (2) the problem of the reaction of the host to transplanted foreign tissues. For this work the so-called endocrine glands have obvious advantages over glands with external secretions, or the various connective tissues and, indeed, over tumor tissue.

In the course of our work during the past three years, we have studied the transplantation of ovary, suprarenal (cortex and medulla), spleen, parathyroid and thyroid of rabbits. Because the thyroid has several great advantages, namely, its accessibility, its wide range of morphologic changes, which are easily interpreted, and its specific iodin reaction, all useful in checking and controlling results, we have devoted more time and effort to the study of this tissue, and the summary to follow is based for the most part on our experiments with the thyroid gland. Our experience has been confined wholly to autotransplantation and homotransplantation, and for the sake of clearness it seems best to present the data under these two divisions rather than according to the tissues used.

AUTOTRANSPLANTATION

We have made nine experiments with ovarian tissue, transplanting in the subcutaneous tissues of the abdomen after removal of both ovaries. In all cases the stroma, interstitial cells and graafian follicles showed survival and growth over periods varying from thirty-four to 219 days. Mature graafian follicles were recovered from two rabbits, associated with active hyperemia of the uterus and the typical phenomena of rut.

A point of practical importance which we have observed in the older transplants is the presence of hemorrhagic cysts, due to the fact that the ripened follicles rupture into themselves instead of onto a free surface as occurs in the normal, and these cysts ultimately produce pressure atrophy of the ovarian tissue. Apart from this complication, our work confirms that of many others that these autotransplants are permanent and show all the evidences of functional activity.

As a part of other experiments, we have made six autotransplantations of spleen tissue in the subcutaneous tissue of the abdomen, all of which were absorbed in twelve days.

Parathyroid tissue has accidentally been transplanted many times with the thyroid, and we have often found active normal looking parathyroid tissue in thyroid transplants when examined microscopically.

In the first 100 rabbits used, thyroid was successfully transplanted into ovary, suprarenal, spleen, jugular vein, muscle, subperitoneal tissues and into the subcutaneous tissues of the neck, chest and abdomen. In the second 100 rabbits, transplantations were made uniformly in the subcutaneous tissue of the abdomen, modified by one or more of the following conditions: with the thyroids intact, partially and completely removed; with and without removal of spleen suprarenals, ovaries, and testes; with and without the administration of phosphorus, and with and without the administration of iodin using both normal and hyperplastic thyroids. Of these factors, the removal of a large part of the thyroid gland or the administration of iodin materially modifies the growth and activity of the autotransplants.

Autotransplants uniformly "take" and "grow," the amount of growth being determined by the amount of thyroid removed and also by the administration of iodin or desiccated thyroid. Cristiani and von Eiselsberg also observed that removal of the thyroid caused compensatory hyperplasia of transplants irrespective of their location in the body. We can confirm this observation. In every instance, it was found that the histologic condition of the transplant was identical with that of the thyroid gland. Both undergo hyperplasia simultaneously and to the same degree, and both involute simultaneously and to the same degree.

Following the administration of iodin, transplants take up and retain it to the same degree as the thyroid gland. Many authors have stated that transplants of thyroid were permanent. We have observed transplants for more than a year through the phases of spontaneous and induced hyperplasia and involution, and can confirm the statement that they are permanent irrespective of their location.

Inasmuch as such transplanted thyroid tissue undergoes all the morphologic variations associated with growth and function that are observed in nontransplanted thyroid tissue, and inasmuch as transplanted thyroid shows the same reactions with iodin and the same storage of iodin as nontransplanted thyroid, we believe that this is sufficient evidence that such transplants may grow, involute or function equally as well as nontransplanted thyroid. We cannot accept the belief held by some observers that specific nerves, whether secretory or regulatory, are nec-

* From the Laboratory of Experimental Medicine, Western Reserve University.
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essary for normal growth or functional activity of the thyroid. The evidence obtained from these observations suggests that the thyroid is truly a blood gland in that the stimuli causing either increased or decreased activity may reach it directly by way of the blood stream. These conclusions are based on the study of 289 autothyroid transplantations in 141 rabbits observed during periods varying from three to 381 days. In forty-one rabbits, only autotransplantations were made, and in 100 both autotransplantations and homotransplantations were made; in thirty-two of this 100, negative homotransplantations had preceded the positive autotransplantations.

HOMOTRANSPLANTATION

We have made twenty-six homotransplantations of sexually mature ovarian tissue, all but one of which showed complete absorption of the ovarian structure except for the interstitial and luteal cells. The one exception was probably an instance of the failure of the host to react to the foreign tissue in the usual way. The fact that the lipoid cells of the ovary can survive upward of 193 days, while the stroma and egg cells undergo absorption in a few weeks, shows that in the lipoid-containing tissue we are dealing with a different order of cells against which the host reacts very slowly, if at all. There is evidence from the standpoint of transplantation, as well as from that of embryology and morphology, that the cells of the suprarenal cortex belong to this series also. Repeated homotransplantations into the same animal of these lipoid-containing cells of the ovary would probably determine whether or not the host eventually develops a resistance to this tissue also. Up to the present we have not made sufficient experiments to determine this point. The two important facts observed in this series of homotransplantations of the ovary are that: (1) the host reacts in the usual way and usual time to the egg and stroma cells, and (2) the host reacts very feebly to the lipoid containing cells.

We have made eighteen homotransplantations of the spleen, all of which were absorbed in twelve days.

Homotransplantations of thyroid were made in spleen, bonemarrow, suprarenal, ovary, testes, liver, muscle and subcutaneous tissue of neck and abdomen. Purely for the convenience of subsequent examinations, we have used the subcutaneous tissues of the abdomen for all transplants during the past two years.

Up to the present we have made 567 homotransplantations in 205 rabbits of various ages. In 105 of these only homografts were made. As in the case of thyroid autografts, the conditions have been varied as follows: with and without removal of the thyroid, ovaries, spleen and testes; with and without administration of iodin and phosphorus, using phosphorized and iodized thyroids separately and together.

A tabulation of the results shows that complete absorption may take place as early as the tenth day, and usually occurs before the thirtieth day in cases which have not been previously homotransplanted. As is well known, repeated homotransplantation markedly accelerates the destruction of homografts, due to the development of an immunity, the nature of which is little understood. On the other hand, we have under observation two rabbits containing homotransplants of more than a year's duration, which grossly and microscopically resemble autografts. Between these two extremes, there are all gradations in the rate of destruction. This to our minds is the most significant fact we have observed, and, in reviewing the literature, we have been unable to find reports dealing specifically with these variations in large series of nontumor transplantations.

A thorough understanding of these variations would go far toward explaining the causes of the failure of homotransplantation and, as the students of tumor point out, it is also the most important problem confronting them. It seems well established that these variations depend on the development of an immunity to a foreign protein (tissue), and tumor investigators have shown that the degree of foreignness of the tissue used is the most important factor in its development. A study of our thyroid material suggests that these variations in the rate of absorption may be due to intrinsic differences in the reaction of the host, quite apart from and in addition to the other important factor of the foreignness of the tissue used. In the series of 205 rabbits about 92 per cent. destroyed initial homografts in from ten to thirty days, and subsequent homografts, as is well known, were destroyed more rapidly. The remaining 8 per cent. of the rabbits showed strikingly less rapid reactions even though the same gland was used for the two groups in most instances, and the factor of blood relationship could be considered most remote. The following instance, of which there are several others in the series, may be mentioned in some detail in support of the foregoing statement.

The thyroid slightly hyperplastic, of Rabbit 233 was transplanted into three rabbits (Rabbits 226, 227 and 229), May 8, 1915. Within thirty-seven days the transplant in Rabbit 226 was completely absorbed, and within ninety days the transplant in Rabbit 227 was absorbed, while the transplant in Rabbit 229 is still large and active after 400 days. June 14, 1915, the thyroid of Rabbit 263 was also transplanted into Rabbits 226, 227 and 229 and, in addition, as initial grafts into six other rabbits, and as second homografts into four additional rabbits. This thyroid (from Rabbit 263) had disappeared from all but one of the thirteen rabbits at the time of the first examination, the single exception being Rabbit 229, which still has a homotransplant of 400 days from Rabbit 223. This second positive homograft was removed at the two hundred and forty-third day, and in both gross and microscopic appearances had all the characteristics of an autograft.

These experiments show that one has to deal with variations in the resistance of animals, which is quite independent of the thyroid used. It is clear, therefore, that when one finds an animal in which an initial homograft is positive, subsequent homografts from unrelated animals may remain and act as autografts. On the other hand, we have never seen a positive homograft following an initial negative homograft, no matter what the age, sex or blood relationship of the rabbits used.

Turning now to the second factor in the variations of the rate of absorption, namely, the degree of foreignness of the tissue used, there is evidence that one can modify the rate of absorption by modifying the condition of the host and also the chemistry and physiologic activity of the thyroid used, as is demonstrated in the following experiments:

In three rabbits with thyroids intact (Rabbits 237, 238 and 239), potassium iodid was given in 20 mg. doses for two weeks previous to transplantation. These three were then partially thyroidectomized and transplanted on the left side from the thyroid of Rabbit 254, in which marked hyperplasia had been induced by a previous partial thyroidectomy. The same hyperplastic thyroid was transplanted into the left side

of two other rabbits (Rabbits 255 and 256) which had had similar previous partial thyroidectomies and whose thyroid stumps were hyperplastic. The iodized and quiescent thyroid of Rabbit 237 was at the same time transplanted into the right side of all five (Rabbits 237, 238, 239, 225 and 256). Subsequent examination of the thyroid grafts made from the hyperplastic thyroid into both the iodized and noniodized rabbits shows that in the two rabbits (255 and 256) with previous partial thyroidectomies absorption occurred in thirty days; while in the three iodized rabbits (237, 238 and 239) the grafts disappeared in one (Rabbit 237) after fifty days; in the second (Rabbit 239) it was positive and was recovered at necropsy 144 days later and in the third (Rabbit 238), the graft was positive at 149 days but had disappeared at the two hundred and first day.

Subsequent examination of the right thyroid grafts made with the iodized thyroid of Rabbit 237 shows that in the noniodized rabbits (255 and 256) absorption occurred in the usual time, while in the two iodized rabbits (238 and 239), this thyroid was removed in one (Rabbit 239) at necropsy 144 days later, and in Rabbit 238 the transplant is still large and active at 382 days and resembles in all respects an autograft.

This series of experiments shows clearly that when iodized thyroid is homografted into iodized rabbits, the rate of destruction is markedly decreased. As iodin is a physiologic constituent of thyroid, and as these experiments show that its previous administration to both donor and host delays the rapidity of absorption of homografts, it seems certain that it is possible to modify the usual reaction of the host by strictly physiologic means. While iodin favorably affects the thyroid, there is no evidence that it has a similar action on other homografted tissues. Its influence on the fate of the thyroid homograft suggests, however, that it may be possible to modify the host's reaction to other homografted tissues through one or more of their specific chemical constituents.

SUMMARY

Concerning autografts we have been able to confirm the conclusions of others that thyroid when transplanted shows all the evidence of growth, function and permanence, and to the same degree, as does the nontransplanted thyroid. This work also shows that specific nerves, whether secretory or regulatory, are not necessary either for the control of growth or of function in the case of the thyroid.

Concerning the behavior of thyroid homografts, it seems established that both the host and the tissue used for the grafts modify their duration. These two factors may be quite independent, antagonistic to or helpful to each other. In the case of the thyroid this reaction may be modified by iodin.

Lastly, the future of tissue transplantation as a therapeutic means rests on a solution of the problem of the homograft, and it is also certain that whatever headway is made in overcoming the obstacles to homografting will to an equal degree be applicable to the solution of the tumor problem.

ABSTRACT OF DISCUSSION

DR. ROBERT T. MORRIS, New York: In trying to make rabbits immune to each other's serum, I found that apparently these rabbits absorbed the grafts more readily than rabbits not so treated. This testimony is negative so far as my intention was concerned, but positive in a way, showing that the serologists, at any rate, have a problem before them. Undoubtedly in making transplants we shall sometimes sensitize. In some cases in which we produce allergic phenomena with our transplants, we shall be enabled to work out further treatment on the basis of the degree and effect of the allergic response.

Sometimes a graft may not serve as a graft, but may have other functions. A patient had lost both his testicles as the result of mumps. I grafted a testicle from another man. The testicle which I grafted gradually underwent absorption, but what happened was this: that graft stimulated the energy of the testicle that had been formed, and that young man now has a testicle one-third the normal size on that side, with full semiesthesia. We have an unlimited field. Supposing, for instance, that we might in the case of tuberculosis of the suprarenal glands transplant a normal suprarenal gland. I have done it, have folded it into the omentum. It takes kindly, and we may then relieve the work on the suprarenal gland, in such a way that even though the graft undergoes absorption, we may obtain some control over the tuberculosis by strengthening the part, and then increasing this patient's general resistance.

AMINO ACID NITROGEN IN THE SYSTEMIC BLOOD OF CHILDREN IN HEALTH AND DISEASE*

C. J. V. PETTIBONE, PH.D.
AND
F. W. SCHLUTZ, M.D.
MINNEAPOLIS

The recent trend of investigation in the field of metabolism has served to demonstrate the importance of the amino acids in the metabolism of the proteins. As was shown by Folin and Denis[1] and Van Slyke and Meyer,[2] amino acids are present normally in the blood. Final proof of this fact was furnished by Abderhalden,[3] who succeeded in isolating and identifying several of this group of compounds from large amounts of blood, and by Abel, Rowntree and Turner,[4] who obtained considerable quantities of amino acids from blood by their ingenious method of vividiffusion. From these and other observations the conclusion has been drawn that the digested proteins of the food are absorbed as amino acids and as such are transported to the tissues.

The amounts of amino acid nitrogen in the blood of different normal individuals or even of the same individual at different times have been shown by Van Slyke and Meyer[2] to vary widely, the amounts given by these authors ranging from 4.5 to 8.5 mg. nitrogen per hundred c.c. of blood. Numerous reports have been made of variations in the total nonprotein nitrogen of the blood in disease, and in urea nitrogen, which is the largest factor of the nonprotein nitrogen, but only isolated attempts have been made to discover whether or not the amino acids in the blood were subject to characteristic variations in pathologic conditions, and these with but indifferent success.

Segale[5] reports an increase of amino acids in the serum in anaphylaxis. Kaplan[6] and later Kaplan and McClelland,[7] have reported that in syphilis the amino acid nitrogen in the blood is habitually low; but Ellis,

* Read before the Section on Diseases of Children at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

* From the Department of Physiology and the Department of Pediatrics of the University of Minnesota Medical School and the Minneapolis City Hospital.

1. Folin and Denis: Jour. Biol. Chem., 1912, xi, 87.
2. Van Slyke and Meyer: Jour. Biol. Chem., 1912, xii, 399.
3. Abderhalden: Ztschr. f. physiol. Chem., 1913, lxxxviii, 480.
4. Abel, Rowntree and Turner: Jour. Pharmacol. and Exper. Therap., 1913-1914, v, 275.
5. Segale: Zentralbl. f. Biochem. u. Biophy., 1913, xv, 269.
6. Kaplan: New York Med. Jour., 1913, xcvii, 1172; ibid., 1913, xcviii, 157.
7. Kaplan and McClelland: New York Med. Jour., 1913, xcviii, 157.

Cullen and Van Slyke[8] failed to confirm their results. Rabinovitch[9] reports extremely high amounts in the umbilical cord, 37 mg. per hundred c.c. in the fetal portion, and 137 in the maternal portion.

Foster,[10] in studying uremia, although observing considerable variations in total nonprotein nitrogen and urea, reports that the amounts of amino acids remained normal. Gyorgy[11] observed an increase after bleeding. The reports of amino acid content of the blood in pathologic conditions are, however, very meager. In continuation of the work which we have reported[12] on the amino acid content of the blood of normal infants, which was found to average about 4 mg. of amino nitrogen per hundred c.c. of blood, it was decided to extend the observations to pathologic cases in order to determine whether or not there were any marked or characteristic departure from the normal. The discovery of such a characteristic variation might be of considerable diagnostic value, or even throw light on the etiology of the disease.

Observations were made on the amino acid content of the blood of somewhat over sixty children ranging in age from 1 month to 13 years. Of these, ten were normal healthy subjects. The remainder were suffering from various disorders as follows: scarlet fever, 6; diphtheria, 5; bronchial or lobar pneumonia with complications, 5; syphilis, 4; underfeeding with complications, 4; tuberculosis, 3; exudative diathesis, 3; atrophy, 3; nervous disorder, chorea and spasmophilia, 3; measles, 2; nephritis, acute and chronic, 2; rachitis accompanied by varicella and abscess, 2; alimentary disturbances, acute and chronic, 2, and 1 case each of encephalitis, otitis media, Mongolian idiocy, tonsillitis, and ichthyosis.

The blood was drawn by hypodermic from the median basilic vein of the arm, or by Tobler's method from the superior longitudinal sinus, and immediately taken to the laboratory for analysis. The analysis was made by the method of Van Slyke and Meyer.[3] As the amounts of blood obtainable were often small, it was possible to make only about half of the determinations in duplicate. The quantities of blood used in each analysis ranged from 2 to 5 c.c. In one case (Case 34, pneumonia), however, only 1 c.c. of blood was used. Since the amounts of urea and ammonia in the blood are very small (the analysis was begun within one-half hour after taking the sample), correction for these two substances was made as suggested by Van Slyke and Meyer[2] by allowing the deamination process to run for a second period equal in length to the time for decomposing the amino acids, and subtracting the volume of nitrogen produced in this second period from that obtained in the first period. The figures reported in the accompanying table represent milligrams of nitrogen per hundred c.c. of blood.

It will be observed that the figures for normal children, as well as for those suffering from the wide variety of disorders observed, run on the whole somewhat lower than the average values reported by Van Slyke and Meyer for adults. In observing the figures classified according to disease, there appears to be no consistent or characteristic variation from the average values observed in health. This is also true for high temperatures, those subjects suffering from a fever around 104 showing no consistent increase in amino acid nitrogen over the normal, as might have been expected from the increased destruction of tissue protein, although this fact might be accounted for by a corresponding increase in the destruction of the amino acids which were produced by protein hydrolysis.

As was the case in our observations on infants,[12] there appears to be no striking correlation between the amount of amino acid nitrogen in the systemic blood of children and the time which had elapsed since feeding, the values obtained after from fifteen to twenty-four hours of fasting not differing consistently from those obtained from children which had been fed four, five or six hours previous to the taking of the sample.

OBSERVATIONS ON THE AMINO ACID CONTENT OF THE BLOOD IN CHILDREN

Case No.	Age	Condition	Time after Feeding	Temp.	Nitrogen per 100 c.c. of Blood, Mm.
40	10 mos.	Normal	4 hrs.	.....	4.59
22	10 mos.	Normal	7 hrs.	.....	4.46
33	13 mos.	Normal	7 hrs.	.....	2.57
35	5 mos.	Normal	6 hrs.	.....	3.28
36	2 mos.	Normal	6 hrs.	.....	2.65
49	8 yrs.	Normal	8 hrs.	.....	3.66
50	8 yrs.	Normal	8 hrs.	.....	3.71
21	5 mos.	Normal	4 hrs.	.....	3.18
22	7 mos.	Normal	4 hrs.	.....	3.44
20	6 yrs.	Normal	12 hrs.	.....	5.57
23	9 yrs.	Scarlet fever (convalescence)	5 hrs.	.....	3.41
24	8 yrs.	Scarlet fever (3 days)	6 hrs.	102.5	3.74
48	5 yrs.	Scarlet fever (5 days)	5 hrs.	100	4.97
32	7 yrs.	Scarlet fever (2 days)	12 hrs.	103.5	4.41
53	7 yrs.	Scarlet fever (3 days)	12 hrs.	103.8	7.27
14	9 yrs.	Scarlet fever (2 days)	12 hrs.	103	5.48
24	13 mos.	Bronchopneumonia and rachitis	24 hrs.	103.6	1.80
25	5 yrs.	Lobar pneumonia and empyema	6 hrs.	102	3.77
3	6 yrs.	Lobar pneumonia following measles	48 hrs.	104	3.74
18	6 yrs.	Lobar pneumonia (convalescence)	15 hrs.	.....	3.52
28	2 yrs.	Diphtheria (nasal and faucial)	12 hrs.	102	1.56
29	3 yrs.	Diphtheria (nasal and faucial)	12 hrs.	103	3.22
44	3 yrs.	Diphtheria (laryngeal)	4 hrs.	103.6	2.01
5	13 yrs.	Diphtheria (faucial)	24 hrs.	103	3.45
15	4 yrs.	10 days (convalescent typhoid)	4 hrs.	.....	3.32
51	9½ mos.	Syphilis	4 hrs.	.....	5.10
6	1 mo.	Syphilis	4 hrs.	99	3.54
7	2 yrs.	Syphilis	6 hrs.	.....	5.0
8	18 mos.	Syphilis	7 hrs.	.....	5.0
43	10 yrs.	Chorea and spasmophilia	4 hrs.	.....	3.27
17	12 yrs.	Chorea (convalescent)	15 hrs.	.....	3.91
61	9 yrs.	Spasmophilia	12 hrs.	.....	4.16
12	3 yrs.	Tuberculosis (incipient)	5 hrs.	.....	5.0
16	12 yrs.	Tuberculosis (gland and Pott's)	12 hrs.	.....	4.0
19	7 mos.	Meningitis and pertussis	6 hrs.	.....	2.72
20	5 mos.	Exudative diathesis	4 hrs.	.....	3.60
41	2 mos.	Exudative diathesis eczema	4 hrs.	.....	2.44
57	18 mos.	Exudative diathesis	4 hrs.	.....	8.48
27	2 mos.	Atrophy	6 hrs.	.....	2.46
30	1 yr.	Atrophy	4 hrs.	.....	5.67
58	2 mos.	Atrophy	4 hrs.	.....	6.2
37	4 wks.	Underfeeding	4 hrs.	.....	5.2
38	3 mos.	Underfeeding	24 hrs.	.....	3.71
46	2 yrs.	Underfeeding	5 hrs.	.....	5.74
55	5 mos.	Underfeeding	4 hrs.	.....	4.52
9	5 mos.	Enteritis (bloody stools)	24 hrs.	100	3.42
10	11 mos.	Chronic alimentary disturbance and rachitis	6 hrs.	.....	2.98
56	3 yrs.	Rachitis and varicella	4 hrs.	101	2.95
47	3 yrs.	Nephritis (chronic)	24 hrs.	.....	1.24
1	7 mos.	Nephritis (acute)	24 hrs.	101	4.44
31	4 wks.	Measles	4 hrs.	100	2.77
45	4 yrs.	Measles	4 hrs.	103	3.45
11	5 mos.	Otitis media and atrophy	6 hrs.	101	3.87
26	3 mos.	Mongolian idiocy	4 hrs.	.....	5.10
42	7½ yrs.	Ichthyosis	6 hrs.	.....	4.20
40	7 yrs.	Tonsillitis	12 hrs.	100	1.22
13	1 yr.	Encephalitis	9 hrs.	99	6.27

SUMMARY

Although the amounts of amino acid nitrogen in the blood of children appear to be somewhat lower than the accepted values for adults, we were unable to detect any consistent or characteristic variations of amount in the specific diseases examined, and neither marked increase nor decrease in fever.

8. Ellis, A. W. M.; Cullen, G. E., and Van Slyke, D. D.: The Amino Acid Content of the Blood and Spinal Fluid of Syphilitic and Non-syphilitic Individuals, THE JOURNAL A. M. A., Jan. 9, 1915, p. 126.
9. Rabinovitch: Compt. rend. Soc de biol., 1914, lxxvi, 457.
10. Foster, N. B.: Uremia, III, The Nonprotein Nitrogen of Blood, Arch. Int. Med., March, 1915, p. 356.
11. Gyorgy: Compt. rend. Soc. de biol., 1914, lxxvi, 437.
12. Schlutz, F. W., and Pettibone, C. J. V.: Quantitative Determinations of Nonprotein Nitrogen in the Blood of the New-Born, Am. Jour. Dis. Child., September, 1915, p. 206.

STRABISMUS PRODUCED BY OPERATIONS FOR STRABISMUS

A CONSIDERATION OF CAUSES PRODUCING DEFORMITIES FOLLOWING STRABISMUS OPERATIONS, WITH SUGGESTIONS FOR CORRECTIVE OPERATIVE PROCEDURES *

FRANK C. TODD, M.D.
MINNEAPOLIS

Cases of strabismus which have been produced by operations performed to correct strabismus or heterophoria are not uncommon. Perhaps it would be better to call such conditions deformities. In these cases, one or more operations may have been performed. They may be classified under four heads:

1. Cases in which operations have failed fully to correct the strabismus, that is, wherein the strabismus remains, is undercorrected, or is increased.

2. Cases in which an overcorrection has occurred and strabismus of the opposite kind, though in the same plane, exists.

3. Cases in which strabismus in a different plane has resulted, usually combined with one of the failures classified above.

4. Exophthalmos or enophthalmos.

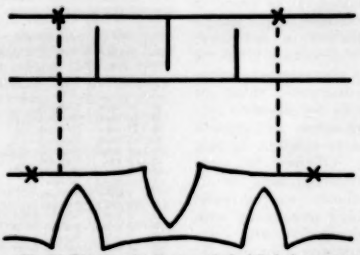

Fig. 1.—Diagram of author's method of limited tenotomy. The change in location of the crosses shows the lengthening which takes place.

CAUSES

In general, it may be said that few failures would result if all cases were thoroughly studied and the indications for operations more carefully considered. The length of this paper does not permit of a discussion of these questions, but they involve these very definite considerations:

1. Should any operation be performed?
2. At what age should operation in the case under consideration be undertaken?
3. What muscle or muscles should be operated on?
4. What method of operation should be practiced?
5. What treatment should be given subsequent to operation?

Class 1: *Incomplete results may be caused by insufficient tenotomy.* While it is never best to sever a tendon completely, it is necessary to cut all of the tendon fibers in one place or another in order to secure any relaxation, and if any fibers remain, failure to secure the desired effect will exist. In the operation of limited tenotomy in which the tendon fibers have been cut in one place or another (as shown in Figure 1) and relaxation does not occur, it is due to the fact that there are some uncut fibers on one or both sides, and these should be engaged in the hook and severed.

A tenotomy may be insufficient and an advancement operation may be required in addition.

Cicatricial contraction following tenotomy of any kind may result in a reduction of the effect at first produced by the tenotomy. This may be prevented or minimized by making the conjunctival incision parallel to and at one edge of the tendon so that the cut edges of the conjunctiva may not come in contact with the cut tendon.

Another very frequent cause of failure to secure the desired effect is through the performance of an *improper advancement operation.* It sometimes happens that sutures in an advancement operation may cut through the tendon of the muscle. It is very easy for this to occur if the sutures are merely inserted into the tendon, as they naturally pull in the direction of the fibers and cut through. In order to prevent this catastrophe, it is necessary to ligate the tendon in one manner or another. And again, the suture may cut through the sclerotic coat. This may be obviated if the suture is placed near the margin of the cornea and is well engaged in the sclerotic coat at right angles to the line of traction that it exerts. The force is

Fig. 2 (Case 1).—Before operation; looking straight ahead.

Fig. 3 (Case 1).—After operation; looking straight ahead.

Fig. 4 (Case 1).—Before operation; extreme rotation to right.

Fig. 5 (Case 1).—After operation; extreme rotation to right.

* Read before the Section on Ophthalmology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

thereby divided. Strong silk thread should be used. In case the suture cuts through the tendon or the sclerotic coat and the tendon has been severed, it may become completely lost, so that the effect of a tenotomy is produced, thereby increasing the degree of the strabismus already existing. Most forms of advancement operations do not permit of regulation, and the operator makes a guess as to the amount of effect that he will secure from his advancement operation. In other words, the results are governed by fate. There are now several operations which may be performed which will enable the operator to regulate the effect to some degree, and one of these methods should be selected.

Herein lies the advantages of a tucking operation. If the sutures slip or cut through, the tendon is not lost; but if properly inserted, they will not cut through or slip. The operation of tucking which I have described[1] not only holds the tendon firmly, but also permits of great advancement and of careful adjustment, and for these reasons seems to me to have distinct advantages as an advancement operation in squint.

Fig. 6 (Case 1).—Before operation; extreme rotation to left.

Fig. 7 (Case 1).—After operation; extreme rotation to left.

Class 2: These cases are also not uncommon. They occur very often as a consequence of the *performance of complete tenotomy on one or both external recti for convergent strabismus, bringing on a subsequent divergent strabismus.* Most of these patients have been operated on early in life, and are cases in which no operation should have been performed. Sometimes they are cases in which the wearing of glasses would have resulted in an eventual cure or in which the strabismus might have corrected itself at a later age. Some of them, however, are produced by operations in later life.

In these cases complete tenotomy has been performed on one or both muscles. *Rarely an advancement operation has been done in addition to the tenotomy,* but this is not commonly the case because the advancement operation seems to be avoided because of its greater difficulties.

The prevention of deformities of this class is thus apparent.

1. Todd, F. C.: Extra-Ocular Tendon Lengthening and Shortening Operations Which Enable the Operator to Regulate the Effect, Ophth. Rec., December, 1914.

If an operator finds a greater effect than he desires to produce after tenotomy, either at the time of operation or a few days later, he should endeavor to recover the tendon and stitch it forward on the globe. If his advancement operation is too great, then he should be able to relax the tension, and if adhesions have already formed, the tendon should be hooked up and

Fig. 8 (Case 2).—Before operation; looking straight ahead.

Fig. 9 (Case 2).—After operation; looking straight ahead.

the eye forced toward the opposite side, thereby stretching or breaking the adhesions sufficient to secure the desired effect.

Rarely should a tenotomy be performed on young children; never until all other measures have failed after a long period of effort; never when any improvement is occurring as a consequence of wearing glasses, however slow the improvement, and never unless the case has been carefully studied and the proper operative procedure selected. It is impossible to tell what the conditions are going to be at a later period of life, and the chances of producing an ultimate greater and far more severe deformity (one which is still more difficult to correct) are more than even. It seems to be agreed that single binocular vision cannot be brought about after an early age. Tests and practice with the amblyscope may enable us to deter-

Fig. 10 (Case 2).—Before operation; extreme rotation to right.

Fig. 11 (Case 2).—After operation; extreme rotation to right.

mine whether or not such a prospect exists, and it may be wise in some cases to operate early if we feel that such operation may facilitate the production of fusion. I am sure from my experience, however, that it is sometimes possible to produce fusion and even stereoscopic vision in later life. I think the production of fusion and perspective are often facilitated by

accurate superimposition of the images, and that therefore it is important to secure an accurate correction when an operation is undertaken. If we are simply to secure a cosmetic result, I can see no reason why the operation should be performed until the patient has reached an age when local anesthesia may be used. In any event, if a tenotomy is to be performed, it should not be free and complete because the tendon may not become reattached to the sclerotic coat. The sclerotic coat is shiny and smooth, and unless denuded by trauma or in some other manner, the tendon will not reattach itself to the globe. A complete and free tenotomy is never necessary, for by cutting the tendon on either side in three places, it is possible to produce just as much effect as may be produced by complete tenotomy (Fig. 1).

Class 3: *If a complete and free tenotomy is performed, the tendon may fall back and reattach itself further up or down than was formerly the case, thus producing a complex strabismus involving a different plane. Advancement operations involving the severing of the tendon, which is then sutured to the globe, may alter the plane of action.* Herein again lies the advantage of the tucking operation.

Fig. 12 (Case 3).—Before operation; looking straight ahead.

Fig. 13 (Case 3).—Before operation; extreme rotation to right.

Fig. 14 (Case 3).—After operation; looking straight ahead.

Class 4: This class does not need much consideration. Exophthalmos may be produced by performing a tenotomy on two opposite muscles. This sometimes occurs when an operator seeks to correct an overcorrected strabismus which has been produced by a tenotomy. Exophthalmos thus produced by too extensive tenotomy may be improved by advancing the tenotomized muscles. Similarly enophthalmos might possibly be produced by too extensive advancement not accompanied by tenotomy.

THE CORRECTION OF DEFORMITIES

It is impossible to lay down any specific rules as to the correction of deformities produced by operations intended to cure strabismus, for, like plastic operations, each one is, to a certain extent, a law unto itself.

As a general rule, it is better to work on the muscle which has become wrongly attached, as where an internal rectus has been tenotomized, giving rise to a divergent strabismus, an effort should be made to find the internal rectus tendon and bring it farther forward on the globe. In this instance I find that the tendon tucker is of great service, as it is difficult otherwise to secure sufficient hold on the tendon. With the instrument, the tendon may be forcibly brought forward and reattached. It may be necessary in order to relax the tension to do a limited tenotomy on the opposite muscle. *It sometimes happens that the tenotomized muscle cannot be found, for it has not become reattached to the sclerotic coat.* It is reasonable to believe that such a muscle has still some power, for the tendon is engaged in the capsule of Tenon and is prevented from slipping way back into the orbit by the check ligaments, and this opinion is confirmed by the results that I have had in advancing a mass of capsule. In those cases there has been secured sufficient power of rotation in the direction of the advancement to lead me to believe that the lost muscle has again become active.

Following is a description of the author's method of performing a capsular advancement operation where the tendon of the muscle cannot be found after it has been tenotomized:

An incision is made about a quarter of an inch from the margin of the cornea concentric with the margin. It having been found that the tendon is not attached to the globe, the mass of capsule is engaged in a pair of broad fixation forceps, this mass being grasped well back and from the scleral surface of the capsule. The mass of capsule thus engaged is now twisted once around to give it body. It is now engaged with two sutures applied from within out, which are inserted deeply into the tissues. Each of the sutures is now inserted into the episcleral tissues near the margin of the cornea at right angles to the tendon. The under surface of the capsule that is to come in contact with the eyeball is slightly scarified, and the sutures tied. The effect is regulated by the distance backward that the sutures are engaged in the capsule and by the tenseness of the knot.

This operation was performed in Cases 3 and 4 (illustrated in Figures 12 to 18), and it may readily be seen what a tremendous benefit resulted from the operation. Rotation in the direction of the advancement thus made was very good, though, of course not complete. In both of these cases it was necessary to do a limited tenotomy on the opposite tendon; but the tenotomy in neither instance was sufficient to correct the defect. The further advantage of the advancement combined with the tenotomy is that whatever effect is secured by the tenotomy is thereby made permanent.

In case a deviation has been produced in a different plane, it will be found that the muscle which has been tenotomized has become reattached further up or down on the globe, giving rise to a deviation in the opposite direction from the place the tendon is attached, as was the case in Case 1 (Figs. 2 to 7); and it will be necessary to sever that portion of the attachment which is misplaced. The tendon then should be tucked and the portion that is folded reattached in the correct location on the globe, care being taken in the tying of the sutures so to regulate the effect as to correct the strabismus in the various planes. Here, too, it may be necessary to obtain a relaxation of the opposite muscle by the performance of a limited tenotomy.

Fig. 15 (Case 4).—Before operation; looking straight ahead.

Fig. 16 (Case 4).—Before operation; extreme rotation to right.

ILLUSTRATIVE CASES

CASE 1 (Figs. 2 to 7).—*Alternating convergent strabismus since infancy.*—A. G., woman aged 19. Right eye converges 30 degrees when she fixes with the left eye. Left eye converges 20 degrees when she fixes with the right eye. Upward rotation of either eye when fixing with the other eye.

EXAMINATION

			In	Out	Up	Down
	R + .50 ax 75		R 80	40	40	50
Homatropin Test		Versions				
	L + .50 ax 105		L 70	40	50	60

Patient has had three operations, probably tenotomies of the internal recti and advancement of the left external rectus.

Operation.—Limited tenotomy of the internal rectus of the right eye and tucking of the external rectus, right eye. The attachment of the internal rectus was found to extend low down on the eyeball, accounting for the upward rotations. Severing of the lower portion of the attachment near the eyeball permitted the eye to drop to its normal position.

Final Results.—Cosmetic result shown by pictures. Rotations in various directions practically normal.

CASE 2 (Figs. 8 to 11).—*Divergent strabismus of left eye 35 degrees.*—E. L., woman, aged 19. The trouble came on one month after operation for convergent strabismus at 5 years of age (probably tenotomy left internal rectus).

EXAMINATION

			In	Out	Up	Down
	R ⅘ + 1.25 ⊃ + 1.00 ax 95		R 45	60	40	60
Homatropin Test		Versions				
	L 9/10 + .50 ⊃ + 2.75 ax 125		L 5	80	40	40

Left eye can turn only 5 degrees to the right.

Operation.—Under local anesthesia, a few fibers, evidently from the tendon of the internal rectus, were found attached well back to the globe. A tucking operation was performed, including a large mass of capsule to add strength. A limited tenotomy was performed on the left externus. Ten degrees overcorrection were produced to allow for stretching, and later regulation.

Final Results.—Result good, as shown by the illustrations. Rotation inward 35 degrees.

CASE 3 (Figs. 12 to 14).—*Divergent strabismus 40 degrees.* (Figs. 12 and 13).—K. K., woman, aged 27. Convergent squint developed at about 2 years of age. Wore no glasses. Was operated on some time between 6 and 10 years of age under general anesthesia. Patient does not know whether one or both eyes were operated on. Never had diplopia.

EXAMINATION

			In	Out	Up	Down
	R ⅞ w + 3.00 ⊃ + 2.75 ax 85		R 45	55	48	50
Homatropin Test		Versions				
	L ⅞ w + 2.75 ⊃ + 4.75 ax 85		L 10	70	40	45

It will be observed that rotations inward of left eye are only 10. This left internal rectus was severed. Probably no operation was performed on the right eye.

Operation.—Under local anesthesia (left eye). There is no internal rectus attached to the sclerotic coat, which accounts for the inability to rotate the eye inward. Limited tenotomy, three incisions (of external rectus). For advancement since no internal rectus tendon could be found, the capsule of Tenon was sutured to the sclerotic coat, as described elsewhere in this paper. Slight overcorrection was produced.

Final Result.—Final cosmetic result good, as shown. Inward rotation power left eye, 35 degrees. When patient fixes with the right eye the left eye is parallel. The patient can, but does not select the left eye for fixing; but if she fixes with the left eye, the right eye immediately diverges. Eyes remain straight because it is natural to use the right eye.

CASE 4 (Figs. 15 to 18).—*Divergent strabismus of left eye 40 degrees.*—R. P., woman, aged 18. There is some question whether this patient originally had convergent or divergent squint, but I believe it was originally a case of convergent strabismus despite the patient's statement. It was first noticed six weeks after birth. Patient has had left eye operated on three different times. First two operations in childhood and the last one three months ago. All these operations were on the left eye.

EXAMINATION

			In	Out	Up	Down
	R — 1.00 ⊃ + 3.50 ax 45		R 55	45	40	55
Homatropin Test		Versions				
	L + 2.25 ax 45		L 15	60	45	60

Fig. 17 (Case 4).—Before operation; extreme rotation to left.

Fig. 18 (Case 4).—After operation; looking straight ahead.

It will be observed from the illustrations and tropometer findings that the patient could turn the left eye to only a limited extent.

Operation.—On exposing the left external rectus, it was found that it had been previously cut, probably tenotomized. It was attached to the sclera over a considerable area and in a mass of scar tissue. A limited tenotomy was performed (left eye). An incision was made in the conjunctiva, and after it the usual attempt to find the internal rectus. No internal rectus was present. A capsule advancement, as

described elsewhere in this paper, was performed, attaching the capsule to the eyeball. Five degrees overcorrection were produced.

Final Result.—The illustrations show that the cosmetic result was good, and that rotation was very satisfactory in all directions. Tropometer measurements taken fifteen days after the operation on the left eye showed the following:

	In	Out	Up	Down
L	50	40	40	50

It will be seen that there was an inward rotation of 50 degrees against a former rotation of 15 degrees.

506 Donaldson Building.

A NEW SHORTENING TECHNIC

WITH REPORT OF FORTY-TWO OPERATIONS *

RODERIC O'CONNOR, M.D.
Chief of Ophthalmic Service, Merritt Hospital
OAKLAND, CALIF.

The basis of my claim as to the value of my operation is that it puts into the hands of the profession a method whereby the average oculist can get consistently good results (functional as well as cosmetic) if he will but study the theory of muscle work in order that he may be able to determine, in any given case, the proper muscle on which to operate.

If this claim is correct, and I hope to prove such to be the case, it necessarily follows that the vast number of cases, heretofore treated by temporizing measures, can be cured, and thus much time and suffering can be saved. The value of the method is therefore incalculable to that large class of people who have no access to those ophthalmologists who, by extended experience, are able to get good results from operations that are mechanically and surgically wrong in principle.

I feel that the foregoing statements are true because my results have been so consistently good—this in spite of the fact that my opportunities have been far less than those of even the average oculist. Therefore, I have to give credit to the method alone and not to any special abilities resulting from long experience in muscle work. I have been aided, of course, by my interest in and study of the muscle question so far as it has taught me to locate the muscle on which to operate. Any oculist can do the same and should, therefore, be able to equal my results.

I do not believe that the study of the extra-ocular muscle balance presents anything especially difficult, and do believe that the following are some of the causes which have operated to favor that idea:

1. A lack of agreement as to the cause of these imbalances, from which there naturally follows a lack of agreement as to the treatment. I myself favor the theory that the prime underlying cause is anatomic, consisting in anomalous development of the muscles which may show as either a defect in power to move the eye or as an excess in power.

2. The vogue of tenotomy, which, when complete, often made matters worse, and when of the partial variety often required repeated operations with failure at the end. The indications for tenotomy are rare, and in my opinion it should be done on the lateral muscles as the primary operation only in cases of moderate exophoria when combined with good convergence.

3. The uncertainty of results from shortenings and advancements except in the hands of those few who are qualified by long practice and special experience.

4. The reservation of operation to a place of last resort, thus prolonging suffering and possibly decreasing the chance of a good result from an operation too long delayed.

Therefore, in my opinion, it has not been the difficulty of the study so much as the frequency of poor results from operations, mechanically incorrect in principle, that has kept the profession, as a whole, from doing good muscle work.

It is also my opinion that the time is not far distant when operative muscle work will not be done "as a last resort" but will be done, like other operative work, on clear indications and at the earliest practicable moment. Nose and throat work when through many years during which most of the work was of a temporizing nature (like the average handling of muscle cases), till now it is recognized as an operative specialty, and the one who follows the older methods is put down as a "putterer."

SURGICAL PRINCIPLES

The avoidance of constriction of tissues by sutures and of tension on sutures are such well established surgical principles as to need no more than mere mention. The advantages of my shortening method all flow from the fact that neither of these are violated, in this respect being the only method which does not violate them.

In suturing tendons of muscles that move the extremities, tension can usually be avoided by properly positioning the part so as completely to relax the muscle whose tendon is sutured, and maintaining this position by splints during the healing period.

In suturing tendons of the ocular muscles this cannot be done, and so constriction and tension have been considered as necessary evils. In order, therefore, to lessen the unavoidable loss in effect following advancements, much time and thought have been given to securing firm anchorages for the sutures so as to hold the tendon forward as long as possible and thus give time for union to occur. Also the necessity for marked overcorrection has been emphasized in order to increase the chances of the final union occurring at approximately the point desired. This, in itself, was a cause of trouble, as it greatly increased the tension on the sutures unless the opponent was cut.

Binocular bandaging, as the closest approach to splinting possible, was advised, and Worth considers ten days in bed with both eyes bandaged necessary to insure a good result.

All these difficulties are enough to make the occasional operator (not to speak of his victims) hesitate, and have served to make tenotomy the operation usually done, although, in my opinion, it is seldom properly indicated.

The mechanical factors that operate against successful results in advancements are:

1. Constriction of tissues by sutures or ligatures.

2. Tension on point of union by the operated muscle and its opponent.

3. The anatomic formation of the tendons with their parallel fibers but loosely held together.

4. Stretching of the operated muscle, causing paresis.

5. Retraction of the globe into the orbit.

* Read before the Section on Ophthalmology at the Sixty-Seventh Annual Session of the American Medical Association, Detroit, June, 1916.

Constriction of itself, even though there be no tension, is sufficient to produce sloughing of the constricted tissues. This sloughing produces a loosening which in turn permits the tendon to slip back through the now loose suture loop. These sequelae are increased by the tension of the operated muscle and its opponent through their tone when at rest and their contraction when in action.

Paresis from stretching should be only temporary, and this may explain those of my cases in which the immediate effect was apparently insufficient and yet the final was full.

Retraction into the orbit I believe does occur and especially in shortenings of the interni. My results in such cases have been much less in operating on the interni than the externi, even though the actual amount of shortening of the tendon itself be the same. My case reports show this. My idea of the explanation will appear later when considering Landoldt's statement that a permanent overcorrection from advancing an internus is impossible.

Overcorrection, in my opinion, should never be necessary with an operation correct in principle, unless to allow for retraction into the orbit. This has turned out to be true with my method, for in all my cases of esotropia, since I have learned the importance of a wide band, the effect has actually increased during the healing process, even though both eyes be left unbandaged for use in the ordinary occupation of the patient. Figuring from the circumference of the globe, we know that the contraction of a muscle equal to 1 mm., *with the attendant relaxation of its opponent,* will rotate the eye through an arc of 5 degrees. The normal inward rotation (55) plus the normal outward rotation (45) makes a total arc of about 100 degrees. This means that each horizontal rectus varies its total length about 20 mm. from extreme contraction to extreme relaxation.

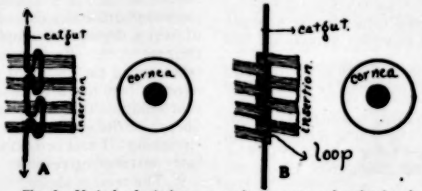

Fig. 1.—Method of placing gut, and appearance after looping is complete.

The points of this observation are:

1. In the primary position there must be considerable tone in the muscles.

2. In cases of concomitant squint, in which the actual rotations are not far from normal, there should be no call for tenotomy to aid an advancement, if the advancement be correct in principle; for by our rotation measurements we have proved the ability of the opponent to relax far beyond the point at which we wish to place the deviating eye. The need for tenotomy, in my opinion, depends on the presence or absence of contraction in the opponent which would be shown by the rotations.

DEVELOPMENT OF THE METHOD

In the fall of 1911, when stationed in Southern Arizona with a cavalry regiment, and therefore riding a great deal, the idea occurred to me that an ocular tendon could be shortened in the same way that saddle girths are shortened when for any reason a smaller one is needed but unobtainable. This is done by looping each strand of the girth about a piece of rope laid transversely. The girth is shortened approximately the circumference of the rope used. It is clear that the rope takes the constriction of the strands of the girth, and for that reason there is no tendency to cut the girth.

In applying this method to an ocular tendon, all that is necessary is to divide the tendon into several strands and use catgut as the shortener. Figure 1 (*A* and *B*) shows in a diagrammatic way the method of placing the gut and the appearance after the looping is complete. In this method, while secure, I considered it possible that on absorption of the gut the loops might straighten with loss in effect. Therefore I thought it safer to shorten a band on each margin of the tendon wide enough to take the full muscle action, and then to suture the central section forward an amount equal to the marginal shortening, which would free it from all tension during the healing. At the same time it was thought better to increase the effect by making a double loop. Consequently my work has been in the latter procedure. However, I have had several cases in which my effect was permanent from dividing the tendon into several strands and looping each, so apparently my first fears were without foundation. I now believe, therefore, the first method will prove to be all right for phorias in which a low effect is desired (Case 25).

It is apparent that the mechanical shortening of the tendon is certain, and can be varied as desired. The shortening in the total muscle is not so certain, but depends on its own power as well as that of its opponent. I can state positively, however, that no loss can occur at the point of shortening if the loops are properly placed and if the retaining ligature is not tied so tightly as to cut the tendon bands.

TECHNIC IN DETAIL

A. Exposure of the tendon.

1. The conjunctival incision is curved, its summit being a little external to the center of the scleral insertion of the muscle; the ends are opposite their respective tendinomuscular junctions and distant therefrom about 3 mm.

2. This flap must be laid well back (Fig. 2 *a*) as much as possible by blunt separation to avoid hemorrhage.

3. Undermine the conjunctiva toward the cornea (Fig. 2 *c*) to make a space for the central section of the muscle.

4. Nick capsule of Tenon at one margin of the tendon, and lift entire tendon with its capsule on a strabismus hook. In this way the possibility of cutting a fragile tendon is avoided.

5. The incision of the capsule of Tenon follows in a general way that of the conjunctiva, and the capsule is laid back (Fig. 2 *b*) from the surface of the tendon by blunt dissection as far as possible. This separation may be more easily started a couple of millimeters back of the insertion, where it is freely movable and not adherent to the tendon as at the insertion.

6. It is important to have the entire tendon in full view in the subsequent steps; therefore its margins must be free in their entire length from the insertion to the muscle substance (Fig. 2 *d*).

B. Tendon splitting.

1. Separate a strip of tendon from each margin about 2 mm. in width and extending from close up to the scleral attachment out to the muscular portion. This must be done bluntly, and an eye spud makes a convenient instrument. It is important to have the tendon strips of practically equal width (Fig. 3 *a*).

2. Ligate the remaining central section of the tendon about 4 mm. from the line of insertion (Fig. 3 *b*), using 00 or 000 catgut. Cut one end close, leaving the other long for traction

purposes later. Cut this central section about 3 mm. from the insertion and lay it back out of the way (Fig. 3 *c*).

C. Separate body of muscle from any possible adventitious attachments to the sclera.

D. Shortening the marginal strips.

1. Use 20 day Lukens catgut because it contains no irritating substance, such as chromic acid, which might cause a reaction.

2. It must be made completely flexible by soaking in tepid sterile water. This is very important, for if the least stiffness is present, the succeeding steps are made more difficult.

3. Double the strand, which should be about 10 inches long, and pass the center loop under one marginal strip, using a small hook to help draw the loop under the strip (Fig. 4 *b*).

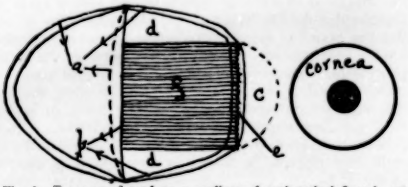

Fig. 2.—Exposure of tendon: *a*, outlines of conjunctival flap; *b*, outlines of flap in capsule of Tenon; *c*, area of undermined conjunctiva; *d*, sclera-clear view of and easy access to margins of tendon; *e*, line of insertion on sclera; *f*, tendon.

4. Draw the two ends through the loop (Fig. 4 *c*), and pull down fairly snugly around the *center* of the strip, thus making a double half hitch. It is *very important* to have the loop in the center for, if too close to the line of insertion, there may not be enough length of tendon to make the loop on that side.

5. Arrange the ends as shown in Figure 6 *a*, for if crossed as shown in Figure 6 *b*, the next step cannot be accomplished properly.

6. *Straighten* the catgut by drawing the ends in *opposite directions*, whereupon the double loop will be transferred and now appears in the tendon, the gut being straight (Fig. 6 *c*).

7. The assistant must hold the catgut taut during the succeeding steps.

8. The two tendon loops are slid into *close contact* with each other by pinching with iris forceps. This is *very important*, for it serves to take the slack out of the catgut and thus prevents the retransfer of the double loop back to the catgut.

9. These loops are held in this close contact by a 00 or 000 catgut ligature (twenty day) placed as shown in Figure 6 *c* (the white knot). It is not tied tightly, for it is not intended as a suture, but merely to prevent a retransfer of the double loop. Cut ends close.

10. Cut ends of large catgut as shown in Figure 6 *c* at the black lines on each side of the loop, which shows diagrammatically the appearance of one marginal shortening completed.

11. Shorten the other marginal strip.

E. Suturing central section. A double armed thread of 000 twenty day gut is used, the two needles being passed through the tendon stump from below as shown in Figure 4 *c*, thence through the central section, thence through the capsule of Tenon, and tied as shown in Figure 5 *c*, the assistant holding the tendon forward by gentle traction while the tie is being made. The traction end is then cut off.

F. Conjunctival Suture. I now use kangaroo tendon divided finely so as to pass easily through the eye of the finest eye needle. The needle pierces one margin of the wound from below, and passes over and pierces the other margin from without. As the tie is made the conjunctiva everts, but on cutting the two ends it returns to position, carrying and burying the knot. Place as many as needed to close the wound properly. As all the knots are buried, there is nothing to irritate the palpebral conjunctiva, and so patients complain of but little pain.

G. Bandage the one eye for two or three days for protection only.

To repeat, the points essential to success are:

1. A clear field of operation with the entire tendon in view.

2. Placing the catgut loop the proper distance from the insertion.

3. Sliding the tendon loops into close contact and retention in that position by the ligature of fine catgut.

COMMENT

1. There is no constriction in the marginal shortenings, which are by loops, not sutures. These loops of tendon constrict the catgut, not themselves.

2. The suture holding the central section is free from tension — the marginal strands taking the full muscle pull even when in action. Therefore there is no need for overcorrection.

3. For these two reasons there can be no loss of effect through slipping or through cutting and sloughing of sutures.

4. Before the catgut can be absorbed, the central section is firmly united to the sclera.

5. The "bunch" is not large.

6. The effect is necessarily straight forward; therefore no torsion or vertical deviation can follow.

7. There is a *definite shortening in the inelastic tendon* equal to twice the circumference of the catgut used plus the length taken up by the overlapping and thickness of the marginal strip.

8. The amount of shortening may therefore be varied by (*a*) the size of gut, and (*b*) the width of the tendon band. It is possible to graduate the effect to correct phorias as well as tropias, as shown by the case of seven degrees of esophoria. The wider the band, the greater the effect, owing partly to the actual length taken up in the loop, but chiefly to the fact that more muscle fibers are thus allowed to take the strain of the shortening. The narrower the band, the fewer the fibers and the greater the chance for loss in effect from stretching. I feel certain that this explains some of my early insufficient results.

9. The tendon shortening does not, of course, represent the total, for the muscle fibers are elastic and must stretch a variable amount, depending on the power of the muscle itself and that of its opponent. This, therefore, I believe to be the only unknown quantity in this operation.

Fig. 3.—Tendon splitting: *a*, tendon strips separated; *b*, ligature on central section, one end left long; *c*, line of cut across central part; *d*, scleral stump of tendon.

10. It can be done as an office operation, as shown by practically all my cases. This is so because the shortened marginal strands are able to take the full muscle pull. To determine this positively, I operated a number of times on pig's eye muscles. After shortening a strand of tendon I would apply force until rupture occurred, and in every case it took place at the tendinomuscular junction and without affecting the point of shortening. If Howe is correct in stating that the internus has a maximum lifting power of but 1 ounce, it is clear that by no possibility can the point of shortening be affected by the full muscle pull plus that of its opponent.

11. This splint principle can be used in connection with almost any of the other types of advancement, for: (*a*) the central section may be resected, tucked, or actually advanced, using scleral or other sutures, and (*b*) a central band may be shortened and the lateral portions be handled as in Worth's and similar methods.

12. Several of my cases show that the marginal shortenings are permanent even after the catgut is absorbed. Therefore the method can be used to correct torsions as follows:

(*a*) One margin may be shortened and the other left untouched (Case 30).

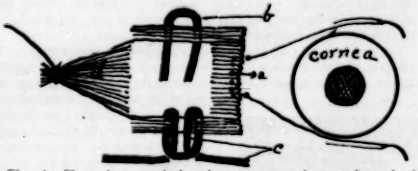

Fig. 4.—Shortening marginal strips: *a*, suture loop under scleral stump; *b*, catgut loop under tendon strip; *c*, ends of catgut drawn through loop around tendon strip; *d*, central section held back; *e*, needles of double-armed thread.

(*b*) Both may be shortened, but one more than the other, using different size gut and bands.

(*c*) One margin may be tenotomized, and the other shortened. This would be the equivalent of Steven's "extendocontraction," with the "contraction" a closer approach to certainty.

13. Size of catgut. The case reports show my results and show that the same result is not always secured from the same size gut. A great deal depends on the condition of the muscle. Outside of this I now believe that the width of the marginal band influences the result as much if not more than the size of gut.

14. There is one point in muscle work which I think is explained by my results, and that is the fact that an overeffect from advancement of an internus is unknown unless the externus be cut. By my method the possibility of loss at the seat of operation is eliminated; therefore the reason must be an anatomico-mechanical one. It is well known that, in shortening an internus, and thus rotating the globe, we put the externus on a stretch — the equivalent of also advancing it. Owing to the fact that the externus wraps around the globe (contact arc) to a much greater extent than the internus, it has a greater leverage. The globe under this double pull must go into a position in which the two forces balance (parallelogram of forces) and therefore must recede into the orbit. The mechanism is probably similar to those cases of divergence with insufficiency of convergence attended with retraction into the orbit on attempts to converge.

This result does not occur to such an extent when shortening an externus, because, while the internus is likewise strengthened, its leverage is not increased by an increase of its wrap about the globe. In the primary position the internus has but little contact with the globe as compared with that of the externus. Figure 7 shows this more clearly than any description. The less the degree of divergence, the less effect proportionately, till in pure cases of insufficiency of convergence the distant balance remains unchanged in spite of the enormous increase in the power of convergence secured, all of which bears out this idea and Landolt's statement.

Using this operative procedure, it is my opinion that shortenings should be the operation of choice, reserving tenotomies as a means of "fine adjustment" to correct any remaining deviation. In this connection and at this time I believe that my multiple incision method will give all the effect desired. In one of my cases in which there was a remaining exophoria after shortening both interni, it gave me 22 prism degrees of effect, 18 of which were over. I had to fish in and suture forward finally, securing orthophoria. This is cited to show that it will afford enough effect.

Finally, I wish to say that I have found it desirable to shorten the interni under general anesthesia because of the lack of space in the inner canthus. The manipulations are felt too much at the origin of the muscle.

REPORT OF CASES

CASE 1.—This was to determine the practicability of the technic, and was on a blind eye exotropic about 15 degrees. Using a No. 3 gut, a complete immediate effect was secured which had diminished very little two years later.

CASE 2.—This was one of about 20 degrees alternating exotropia in which by two operations five months apart a perfect result was secured. In each operation No. 3 gut was used.

CASE 3.—One of 22 degrees esotropia in which about 15 degrees of permanent result was secured, No. 3 gut being used. Second operation refused, patient being satisfied with the cosmetic result from the first.

CASE 4.—One of 15 degrees esotropia in which a complete result was secured in one operation, No. 3 gut being used.

CASE 5.—One of about 35 degrees esotropia in which three weeks after operation there was lateral orthophoria and binocular superposition from one operation, No. 4 gut being used.

CASE 6.—One of 50 degrees esotropia in which by a double externus shortening at one sitting was secured about 40 degrees of correction; No. 4 gut was used.

CASE 7.—One of 50-60 degrees exotropia in which parallelism of the visual axes was secured from one operation, No. 4 gut being used.

CASE 8.—One of 18 degrees esotropia in which the immediate effect was only about 10 degrees, in spite of using No. 4

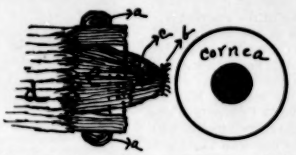

Fig. 5.—Suturing central section: *a*, bunches on marginal strips from looping; *b*, knot of traction ligature on central section; *c*, tie of suture holding central section forward; *d*, muscle; *e*, tendon.

gut. Three days later a gonococcal conjunctivitis developed and ruined any chance, so that the cause of the poor immediate effect will never be known.

CASE 9.—One of 20 degrees esotropia in which an immediate effect of at least 10 degrees over-correction was secured, No. 4 gut being used. Three weeks later the condition was reported to me as one of "perfect correction."

CASE 10.—One of paresis of right external rectus of a year's standing, the result of fracture of base of skull. Binocular field was but 8 degrees to the right while the actual rotation was 40; about 13 degrees less than that of the other eye. No. 3 gut was used, as only a small effect was desired. Twenty days after the operation the rotations were normal with no diplopia, which had been very annoying before. Six months later the result was reported as perfect, there being no diplopia with normal rotations monocular and binocular.

Case 11.—One of 20 degrees esotropia in which a marked overcorrection was secured by a No. 4 gut. This diminished somewhat in the succeeding days, but I had a report stating that six months later there was but 2 degrees remaining esophoria with binocular vision and full comfort in the use of his eyes.

Case 12.—One of 15 degrees esotropia in which the immediate effect was sufficient—a No. 3 gut being used—but six months later the condition was reported as having 7 degrees remaining esotropia. This could easily be corrected by a second operation on the other eye.

Case 13.—One of 70 degrees paralytic external squint of the right eye due to a third nerve paralysis of over twenty years' duration. There was absolutely no power of adduction, the eye being set in the excessive divergence. The eye was blind for all practical purposes, having only $\frac{1}{200}$. It was made clear to the patient that by no chance could a complete straightening be obtained, but she said she would be satisfied if it could be gotten anywhere "to the front." In this case the central tongue was simply laid forward on the sclera, dependence being placed entirely on the marginal shortenings. No. 4 gut was used, and two weeks after the operation the divergence was 20 degrees, giving a result of 50 degrees. In this case, though, a complete tenotomy of the tendon of the externus was done. It seemed as though there was an attempt at adduction made but not a useful amount.

May 24, two and one-half months after the operation, the deviation was between 15 and 20 degrees measured on the perimeter, showing a slight gain. She also had gained a slight power of inward rotation.

Case 14.—This case measured close to 35 degrees deviation inward of the right eye by perimeter and phorometer. In this case also only a cosmetic result was looked for, owing to a marked impairment of central vision due to an old macular hemorrhage. A tenotomy of the internus had been done in the fall of 1914, limited to the tendon proper but without much permanent effect. The right externus was shortened by my method, May 29, using a No. 4 Lukens gut and suturing the central tongue with a 000 forty day Van Horn gut. A slight immediate overcorrection was secured; possibly 5 degrees. This was to naked eye appearance, and most likely due to a slight corneal decentration, as two weeks later the eye tested practically straight on the perimeter. The patient went to her home in Stockton and informs me that she took the bandage off the operated eye the next day and went to her work as stenographer the second morning, and has not lost an hour from her work because of the operation. After four months the eyes were still parallel both to appearance and tests, and there was binocular fusion of red and white images in the red glass test.

Case 15.—One of 50 degrees (arc) concomitant esotropia with marked amblyopia in right eye. The right externus was first shortened, No. 4 gut being used. The immediate effect was markedly insufficient, but at the end of two months there was but 10 degrees remaining deviation. At this time the left externus was shortened, which completed the cosmetic result. After this the patient began to have trouble from a 19 degree hyperphoria, which was not expected because of the poor vision. For this the right inferior rectus was shortened, using 00 gut for fear of overcorrection. This was an error of judgment, as practically no correction was secured. She is now waiting for vacation for me to repeat this operation.

Case 16.—One of paresis right superior rectus with a downward deviation in this eye of 40 degrees. The patient had but 10 degrees upward rotation. She was able to fuse images only in the lower limit of the field. This forced her to hold the chin high, which caused pains in the back of the neck. The right superior rectus was shortened, No. 4 gut being used. Under local anesthesia it was a difficult operation. At the eleventh day she was able to fuse images to a point 10 degrees above the horizontal, as determined on the perimeter. At this time she left for her home in the interior of the state with the understanding that she was to return for operation on the inferior rectus of the other eye. I have been unable to get a further report from her.

Case 17.—One of 22 degrees concomitant esotropia with normal vision in each eye. Right externus was shortened, No. 4 gut being used, with an immediate overcorrection of about 10 degrees. Final effect at end of 4 months: esophoria 1 prism diopter by phorometer; no cyclophoria; no vertical deviation; convergence to 2 inches; stereoscopic binocular vision; prism abduction 17 degrees; a perfect result.

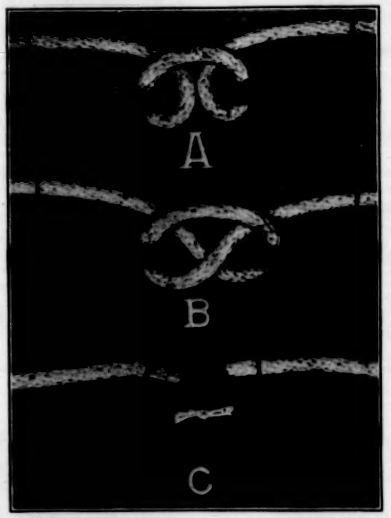

Fig. 6 shows at A the proper arrangement of the catgut ends before straightening; at B the improper way and at C the appearance diagrammatically of a completed marginal shortening.

Case 18.—One of 35 degrees divergence of left eye with a paretic condition of its internus as shown by defective inward rotation. This eye was practically blind from large colobomas of choroid, lens and iris, and was myopic about 20 D. Moreover, each cornea was decentered in 10 degrees. The right eye had the colobomas as in the left, except that the macular region was not involved and the vision was $\frac{20}{30}$, there being but a low error. The left internus was shortened, No. 4 gut being used, with an insufficient result, as the muscle was extremely fragile. Therefore the opponent was cut, allowing a full result. She left for her home in Utah at the end of two weeks when the visual axes were parallel, but there was an apparent divergence due to the corneal decentration. I have had a number of reports stating that this condition is maintained.

Case 19.—One of epilepsy with 7 degrees exophoria and insufficiency of convergence, as shown by diplopia at 8 inches. This was my first case of the kind, and proved to my satisfaction that an overcorrection from shortening an internus is impossible. The first operation was on the left internus, No. 4 gut being used, and a marked convergent squint resulted. This entirely disappeared so that at the end of two months he still had his 7 degrees of exophoria, but could now converge easily to 3 inches from centers. A partial tenotomy of the left external rectus was now done, which as a final effect reduced the exophoria to 5 degrees. As his convulsions had markedly diminished in frequency and severity, we decided to camp on the trail of the deviation, so the right internus was shortened, No. 3 gut being used. Again a marked convergence resulted which disappeared, leaving an exophoria of 3 degrees as a final result with a convergence to 1½ inches from centers. At this date the right externus was cut by my multiple incision method, cor-

recting to 6 degrees esophoria, which had increased to 18 in two days. This was corrected by a mattress suture so that at last was secured a condition of full orthophoria in all directions. His convulsions are much less frequent, and he is now able to get along without bromids.

CASE 20.—One of 35 degrees esotropia (concomitant) with vision in each eye approximately normal. Left externus shortened, No. 4 gut being used, with an immediate effect about 5 degrees under. During the subsequent two months the effect progressively increased till the final stage, when there was an exophoria of 6 degrees by phorometer. At this time there was no cyclophoria and no vertical deviation; prism abduction 18 degrees and binocular vision by superposition as shown by fusion of red and white images and absence of stereoscopic vision.

CASE 21.—One of paresis of right externus since childhood. Outward rotation was but 15 degrees, and she had to look to the left to avoid diplopia. The muscle was shortened, No. 3 gut being used, producing an evident divergence. Condition at the end of six months: binocular vision easily in the primary position and by a special effort as far as 30 degrees to the right; no vertical deviation or cyclophoria; rotates eye out 40 degrees, an increase of 25 degrees; noncomitant esophoria 10 in right and 20 in left. Her singing voice much better, owing to the ability to carry head in normal position, thus avoiding tension on neck muscles.

CASE 22.—One of developing exotropia, the screen deviation being 25 prism degrees. Diplopia cannot be elicited, owing to habit of suppression. However, he can hold eyes in convergence for an instant, and the amblyoscope shows presence of binocular stereoscopic vision. He is a student and has constant headaches. Aug. 30, 1915, the left internus was shortened, No. 4 gut being used. Six months after operation he tests as follows: orthophoria at 20 feet; exophoria 4 at 13 inches, converges easily to 3 inches from centers; reports entire absence of headaches since operation, and has been at his college work continuously since two weeks after its date.

Fig. 7 (from Steven's Major Apparatus of the Eyes) shows that in the primary position the wrap or contact arc of the internus is negligible as compared with that of the externus and hence that contact arc in itself is of no especial importance. The greater the degree of a divergent squint the greater the contact arc of the internus.

CASE 23.—One of 15 degrees esotropia. Had an advancement of right externus with complete tenotomy of its opponent three years ago. That eye could rotate inward only 35 degrees, owing probably to the tenotomy. Left externus shortened, No. 4 gut being used, with the production of a marked divergence; so she was permitted to do without the bandage and directed to rotate eyes in order to lessen the effect. At end of two weeks she had 5 degrees of esophoria, which was entirely corrected by her high hyperopic correction. She then disappeared to her home down the state, and I have not heard from her.

CASE 24.—One of 20 degrees right exotropia due to paresis of right internus shown by defective inward rotation. Only a cosmetic result desired, as vision in O. D. was but $\frac{20}{200}$. The right internus was shortened with the production of a slight convergence. It was found to be very fragile. This lessened in the succeeding days, and as she complained of a pulling pain in the outer side of orbit, it is probable that a tense externus stretched the paretic internus. One week after operation there was 10 degrees exotropia, so that externus was cut according to my multiple incision method. This made eyes parallel, which she had maintained at the end of two months.

CASE 25.—One of 7 degrees (prism) esophoria with headaches. Left externus shortened, using 00 gut and dividing the tendon into five narrow strips, each of which was shortened in the same way. Immediate effect was orthophoria; the final effect at end of two months was 1.5 degrees of esophoria and absence of headaches.

CASE 26.—One of 40 degrees concomitant esotropia; some amblyopia in squinting eye. Left internus shortened as in previous case, but using three tendon strips and No. 3 gut. Final effect at end of two months was 6 degrees—prism—esophoria remaining when wearing correction. This case also improved in effect during the healing period.

CASE 27.—One of 30 degrees esotropia with normal vision in each eye and binocular stereoscopic vision. Right externus shortened, using No. 3 gut and a narrow band with the idea of getting a half correction in this eye and the remainder at a second operation on the other eye. No bandage was used, and she got to wearing her correction the afternoon of the operation. Four days later she had 10 degrees are remaining. This rapidly diminished till at the end of six weeks she had but 3 prism degrees of esophoria. At this time she had 19 degrees prism abduction and entire comfort in the binocular use of her eyes.

CASE 28.—Another case of epilepsy with exophoria of 18 prism degrees. Some time before both externi had been cut by an oculist of Los Angeles without any final effect on the deviation or symptoms. I figured her to have a case of what Valk calls dextrophoria, as her rotations to the left were defective in each eye. So I shortened her right internus, using No. 2 gut and a narrow band. This was an error, and was somewhat in deference to her father's idea, he being an oculist. Only 8 degrees of correction were secured, and without any change in her epileptic attacks. Nine days after the shortening I cut the outer two thirds of the right superior and inferior rectus, because of an idea that they might be the cause of poor result from the complete tenotomies of the externi. The cutting was stopped when she tested exophoria 1 degree and no cyclophoria. This diminished somewhat, so that at the end of twelve days she had 4.5 degrees of exophoria by the screen test and convergence easily to 2 inches. Her epileptic seizures now practically stopped, except when she tried to read. Before this she had to have both eyes absolutely occluded to prevent them. She then went home to Los Angeles. The last report from her father was six weeks later to the effect that she had no trouble except when reading, which would cause a return of her petit mal. In this letter he seemed so positive that all my ideas on the case were wrong that I replied to the effect that "too many cooks" had a bad effect, and if he wanted me to complete the case he would have to leave it entirely to me. This was two months ago, and I have had no reply; so his frame of mind can be easily imagined. My intentions were to shorten the inner third of the right upper and lower recti first, then if necessary to repeat the same operation on the same muscles of the other eye. Owing to an inward rotation of 60 degrees in the left eye and a convergence to 2 inches, I saw no indication for shortening the left internus. I intended to reserve second tenotomies of the externi as an absolutely last resort.

CASE 29.—One of at least 60 degrees esotropia in a cretin 6½ years old. He is also myopic about 7 D. in each eye. Two operations were done at six weeks' intervals, both externi being shortened, Number 3 gut being used each time. At the first operation the central tongue was sutured forward, while at the second the tendon was shortened in three bands. The first operation gave over half of the total error, which was not much improved by the second; so I am inclined to lose my faith in the security of an entire shortening by loops alone in high deviations. At times, however, his eyes are perfectly parallel for distance regard. This patient will need to have further assistance as afforded by my multiple incision lengthening of one or both interni, and will be the first of the entire series to require such aid.

CASE 30.—One of a triple deviation as follows: esophoria 25 degrees of arc, 10 degrees left plus cyclophoria, and 10 prism degrees left hyperphoria. Vision in each eye was $\frac{20}{15}$. Dec. 11, 1915, the lower margin left externus was shortened, Number 2 gut and a fairly wide band being used. This was done through a short incision parallel to the lower margin of the tendon. This gave an immediate correction to exophoria 1, left hyperphoria 1, and left plus cyclophoria 2.

No bandage whatever was used. On the eighteenth he had to leave for his home in northern California, at which date he tested as follows: esophoria 4, left hyperphoria 3, left plus cyclophoria 5. He had, however, binocular fusion without symptoms. He promised to keep me informed of progress, but has failed to do so. I expected in this case to do further operative work to correct the cyclophoria and hyperphoria. This was to cut the upper portion of the same muscle to correct these two conditions. This would increase the esophoria which could easily be corrected by a shortening of the externus of the other eye.

CASE 31.—One of 20 degrees esotropia with normal vision in each eye and binocular stereoscopic vision as determined by the amblyoscope. Left externus shortened, Number 2 gut being used for fear of doing too much. This was an error of judgment, as the final effect was insufficient, there being a remaining deviation of 5 degrees of arc.

CASE 32.—One of 25 degrees arc in an eye practically blind from a corneal wound, the squint existing, however, before the injury. Jan. 30, 1916, left externus shortened, using Number 3 gut and a horizontal incision over middle of tendon, which made the operation somewhat more difficult but left a beautiful scar. The immediate effect was absolute parallelism which was maintained the last time I saw him, seven weeks later.

CASE 33.—One of pure insufficiency of convergence with headaches after near use of eyes and no discomfort in abscence of such use. Diplopia occurred at 6½ inches from rotation centers. He measured as a case of dextrophoria as rotations to the left in each eye were defective. Inward rotation of the right eye was but 40 by tropometer; therefore this was the muscle selected for shortening, which was done, Jan. 30, 1916. March 25, he tested as follows: absolute orthophoria in all directions and a convergence to 3½ inches from centers. Since reaction from operation subsided he has had no headaches from use of the eyes as before.

CASE 34.—One of alternating esotropia of approximately 30 degrees in a child of 3½ years. The refractive error was low, so nothing was to be expected from glasses. In view of the fact that the parents were en route to Honolulu for a three year stay, it was thought best to operate in order to maintain binocular vision. Accordingly the left externus was shortened under ether, March 2, 1916, using Number 2 gut and a medium width band, as an overcorrection was not desired. There was but little reaction, and on March 6, the date of sailing, the eyes were straight to naked eye appearance. As many of my similar cases have gained rather than lost during the healing process, I hope that she will at least maintain her status. This case is given simply to show the immediate effect.

CASE 35.—This was one of 25 degrees alternating esotropia in a child of 3 with good vision in each eye. The right externus was shortened under nitrous oxid anesthesia, March 3, 1916, using Number 2 gut and a medium width band. The tendon was very fragile. This was an absolute failure in that I got practically no effect. In other cases I have obtained corrections of 25 degrees from a Number 2 gut, but the probabilities are that the weak fragile muscle stretched.

SUMMARY

Out of the forty-two operations in thirty-five cases there were but three absolute failures as follows:

Case 8, owing to gonococcus infection several days after operation.

Case 15 on inferior rectus, owing to use of too small a catgut, and thus being an error of judgment excusable when it is remembered that it was my first operation on that muscle and I had no previous experience to guide me.

Case 35, owing also to use of too small a catgut. If this had been a case under cocain the error of judgment could have been corrected at once. In future in such cases I shall allow the patients to come out of the anesthetic to see if enough effect has been secured, and if not, remedy the failure at once.

So far tenotomies have been done only to aid shortenings of the interni, and as it happened in all of these except one (Case 19) the interni were paretic or paralyzed. One case of esotropia (Case 29) will later require partial tenotomy of one or both interni; but this was one of very high degree. I believe this method reduces the need for tenotomy to an absolute minimum.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. TODD AND O'CONNOR

DR. H. W. WOODRUFF, Joliet, Ill.: In general I am in accord with Dr. Todd's deductions in regard to the cause of insufficient effect or over effect following operations on the eye muscles. I believe that the method of shortening by tucking, combined, if necessary, with tendon lengthening or weakening by partial or complete tenotomies is the most satisfactory method of treatment.

I have been a consistent follower of the principles of this operation for the past fourteen years and am unable to understand why so many still practice the uncertain and hazardous advancement which depends after all on a shortening effect on the muscle for its result. Whether the advancement operation is used or the tucking operation, some operation which will weaken the opposing rectus muscle is usually advisable. I see no objection to the tenotomy if it is properly performed and no over effect produced at the time. If such over effect is produced it must be controlled by a suture. There is also a difference in dealing with divergent strabismus as compared with convergence, if the effect of the operation is to be aided by tenotomy. In convergence no over effect is permissible, in fact a slight under effect is desirable. In divergence a slight over effect is a proper primary result. Most of the cases of extreme over effect and deformities following previous operations are cases of divergence secondary to too free tenotomies of one or usually both interni. Those which I have seen were results of operations performed by advertising doctors (The "cross-eyes cured in one minute without the use of the knife" variety). Some of these deformities were very disfiguring, as in addition to the divergence there was exophthalmos and a sunken caruncle and inability of the patient to adduct the eye. Concerning Dr. Todd's method of tendon lengthening, I have had too little experience to judge, but it is certainly less easily performed than a tenotomy and under no better control than can be obtained by a suture.

DR. W. C. POSEY, Philadelphia: I was first led to follow Dr. O'Connor's method because it seemed to offer a chance of advancing a muscle without putting in a scleral stitch. It is desirable often to sew a muscle forward at an early age, and yet most of us do not like to do this until the child is at least 9 years of age, on account of the thinness of the sclera and the consequent danger and difficulty of the operation. The surgical principles of the operation also seem correct, i. e., the bringing forward of the two lateral filaments of the muscle and using them as retaining supports until the main body of the muscle has had an opportunity to unite firmly with the sclera. Contrary to the experience of Dr. O'Connor, in common with my other colleagues at the Wills Hospital who have performed the operation, I have found the procedure a difficult one, one that taxed all my skill as a surgeon. The separating of the muscular fasciculi and the adjustment of the loops calls for considerable nicety of manipulation. Often after the separation of the lateral fasciculi, there is but little left of the middle portion of the muscle to advance, and in several cases where the muscle was very thin, I divided the muscle and brought forward the entire muscle by tightening the loops. While the effect was good for a time, on about the eighth or ninth day the eye slipped back into its faulty position again, showing that the catgut had been absorbed and that no union had occurred in the caught-up loops of muscle tissue. The result of the operation is attained, therefore, by the advancement of the tongue of muscular tissue, as Dr. O'Connor has stated. In several of my cases where the result was not altogether satisfactory, the failure was caused, I think, by tying the 00 catgut strands

too tightly about the No. 4 catgut loops, for I suspect that the muscle fibers were divided in consequence and no support given the tongue flap by the marginal strands. The author fixes the muscle tongue to the sclera by passing sutures through the rest of the muscle left adherent to the sclera. After the marginal loops have been brought forward, however, I have been unable to find this muscle root and have been compelled to anchor the sutures into the sclera. I have operated in seventeen cases, four with divergent, the remainder with convergent squint. No. 4 catgut was used in all of the cases, and I did not try to gage the effect of the procedure by a thinner or thicker gut in any instance. The amount of effect desired was obtained by varying the shortening of the central tongue of muscle fibers and by tenotomy of the antagonist muscles at the time of the advancement. The results were on the whole very good, though I cannot say they were any better than I have obtained by other methods of advancement. There was marked reaction in a number of the cases, and marked sloughing at the site of the operation in two instances. This may have been due to infection, though I suspect that the strangulation of the muscle tissue by too tightly tied gut may have been responsible. Dr. O'Connor's method, however, is a most ingenious one, and deserves to be given repeated trials, for if a muscle can be advanced as he claims without a scleral stitch, it marks a great advance in our operative treatment of squint in young subjects.

DR. OSCAR DODD, Chicago: In regard to those cases in which the internal rectus muscle has been entirely severed with practical loss of movement: We have had some men in Chicago who have advertised to correct strabismus "without the use of the knife." They have operated on these patients in their offices by severing the tendon entirely, or even the muscle itself. I have had the opportunity of operating in some of these cases later, and I have found that the muscle was retracted toward the orbital wall by the check ligament, and when we dissect down we find it drawn back in a mass where it can easily be loosened and brought forward. I think it is a good thing to keep in mind, that instead of simply bringing forward the capsule, as Dr. Todd mentioned, we should endeavor to bring forward the muscle also, as it will give a decidedly better result.

DR. L. HOWE, Buffalo: The discussion recalls by contrast a visit to Stephan Bernheimer of Innsbruck. He wrote the article on the third nerve published in the first edition of Graefe-Saemisch Handbuch. Nearly twenty years afterward I saw him still at work with experiments on the nucleus of the third nerve. The point is that we should hold fast to what we really know if we wish to understand new theories presented here.

DR. G. C. SAVAGE, Nashville, Tenn.: There is one important thing for us always to know, before we do any kind of operation on any muscle, and that is whether there is any thing else to correct than the error of that muscle. To illustrate: One should always know if an esophoria about to be operated on is complicated by a hyperphoria of one eye and a cataphoria of the other, and a plus or minus cyclophoria of both eyes. It is just as easy to correct two or three errors with one operation as it is to correct one error. It must be said that it is also easy, in trying to correct one trouble, to make another worse, or even to bring about a new trouble. But the one who knows what to do and how to do it need not hesitate to undertake muscle operations. The muscle shortening operation, in principle, is here to stay. I devised it twenty-five years ago, and I do not believe that any one of the numerous modifications which have been proposed is as good. This operation is easy to perform and is effective in results. None of the many modifications are as free from trauma, nor can they be more efficient. They are all more complicated and harder to perform. Todd's tenotomy (both a tenotomy and a myotomy) will lengthen the too short muscle and is far preferable to a complete tenotomy. A complete tenotomy of a rectus muscle should never be done. A partial tenotomy, whether central or marginal, at the tendon attachment is easier and, I believe, is better, as to effectiveness. The cut fibers will always retract and the marginal or uncut fibers will stretch. The cut in the capsule should be co-extensive with the cut in the tendon, else retraction will be hindered. No tenotomy should be done on a muscle unless that muscle has excess of tonicity. Always one should be careful not to sever too many fibers.

DR. WILL WALTER, Chicago: I have performed the O'Connor operation three times, and it is a successful operation as far as shortening of the tendon goes. I do not think it may be graduated in the way the tucking operation of Dr. Todd may be graduated. It seems to me, however, to be free from the danger of cutting and tearing that accompany the other operations. One of my cases will interest especially the author and those who have performed the operation. The case was one of about 50 degrees divergent squint with approximately equal adversion—about 30 degrees each eye. I decided to divide the operation between the two interni. I used No. 3 catgut on the first eye and I got about half the correction. When I undertook the other side a month later I could not find any tendon attachment. I undertook capsule advancement and it failed; it tore out. I later went back to the first tendon to see whether or not I could get further through shortening, and the tissues were found all matted. There was adhesion to the ball, about 2 or 3 mm. back from the original attachment. I take it that the hyperemia necessary to absorb the catgut produces tremendous irritation, with adhesions. As the shortening without suture under tension is *the great desideratum* and as the O'Connor operation has its faults, I have a shortening operation of my own and *without any sutures.* It is not sufficiently tried out to warrant its description now but next year I shall give it to you.

DR. WENDELL REBER, Philadelphia: My feeling is that no strabismus operation should be done until we have employed all known measures to secure thorough local anesthesia. Ordinarily sloughing is due to too strong anesthetic solutions. All the synthetic local anesthetics are protoplasmic poisons and if used too freely produce sloughing. It does not make a great deal of difference which operation one employs. I believe with Dr. Todd that any operation which does not disturb the primary insertion is to be preferred to one which does. One should learn to do some one good operation well under perfect local anesthesia. If ethyl hydrocuprein or quinin and urea hydrochlorid in 0.5 per cent. solutions are used the patient will ofttimes have perfect comfort eight to ten hours after the operation. I do the Worth, the LaGleyse and the tucking operation, and I have done Dr. Woodruff's operation. I think any operation, if we do it rightly and study the case as to its rotations before operation, and do it under local anesthesia, with the eyes under the same innervations as the patient ordinarily enjoys, (so that we can control the effect), is most likely to give the good results one is striving for.

DR. F. C. TODD, Minneapolis: The point of my paper was to call attention to the deformities produced by improper operation. It was brought out by Dr. Woodruff and myself that many of the most common deformities were those produced by complete tenotomy. I hope that we emphasized that sufficiently. I disagree with Dr. Savage in the idea that we get any effect unless we cut all the fibers. We do get effect if we do not cut all the fibers if we rupture the rest of them, and that is what it amounts to. I think it is very undesirable to cut the muscle. If you do, it reattaches itself farther back on the globe instead of merely lengthening, as it would if cut on the edges. I want to repeat the suggestion that the wound in the muscle must not be in contact with the wound in the conjunctiva. With the tucking operation that I have previously described, the attachment of the muscle is not changed. The fold in the muscle is forward, and here is where it binds itself down, not changing the attachment to a different location. Its principal advantage is the regulating effect.

DR. RODERIC P. O'CONNOR, Oakland, Calif.: Dr. Posey mentioned the difficulty of separating the marginal bands. The point is to have a large conjunctival incision which will lie back and permit the separation of the margins of the tendon from the capsule of Tenon, so that the entire tendinous portion of the muscle is free and in clear view. Then,

when that stage is reached, I have a hook, not an ordinary tenotomy hook with a curved end, but a probe bent at the end, the portion beyond the bend being straight and about 15 mm. long. This is placed under the tendon which then flattens out its full width. The ordinary hook will bunch it. With the tendon flat you can take a knife or spud and by running it between the fibers easily separate the marginal bands. Leaving the hook in place I then run a pair of blunt iris forceps under the central section, catch the end of the 000 catgut, withdraw and tie the gut about this section several millimeters from the insertion. I do not use a scleral stitch but pass it through the stump of tendon left at the old insertion. In this way the effect of a resection is obtained with a broad surface for union. The width of the marginal bands has a great deal to do with the result. The wider the band, the more muscle fibers are attached to it to take the strain and the less the chance of loss from stretching. The wider the band, within reason, the greater the effect you will get. As far as reaction and sloughing are concerned, I had a severe reaction in the one case in which I tried chromic gut. I have had one case of infection with sloughing but not enough to cause a total failure. This case was operated in a strange place and I found out later that the nurse had used an old stock solution of cocain which I blame as the cause of the infection. I have never had any trouble with 20 day non-iodized gut.

Dr. Posey spoke of two cases in which he thought his sloughing was due to tying the large gut too tightly. I do not think he meant this as the large gut should not be tied.

Dr. Posey: I meant the 00 gut.

Dr. O'Connor: The 00 gut I put in for safety to hold the marginal shortenings simply by making a circle too small to permit reversal. It should be tied without any force in order to avoid constriction of the marginal bands and the consequent sloughing. Another factor that influences the result is the power of the muscle. A weak one will stretch and may require relief by partial tenotomy of the opponent, but that does not affect the shortening in the tendinous portion; there is no slip there. If any loss occurs it is in behind or due to some factor entirely outside the point of operation itself. Cyclophoria can be corrected by this method.

My method gives the same result as Dr. Savage's but it is not a modification of his. The principle is entirely new and I claim that mine is the only method in which tension and constriction are avoided without the use of tenotomies of the opponent. I use finely shredded kangaroo tendon throughout the operation, except where the shortening gut is used so the patient does not have to be bothered by removal of sutures. Tenotomies are not required except as a last resort and in my opinion that is one of the biggest advantages of the procedure.

Fig. 1.—Appearance of interior of stomach, with thickened edge.

The Research Mind.—The research mind keeps up to date in its correlations and brings the inspiration of the best and newest into each teaching day. Sometimes one feels that the external drive toward research by university sentiment leads to many puny efforts and to abortive results. Perhaps, however, even though the result to science is small, the effect on the individual is salutary. The greatest sport the world knows is the search for the absolutely new in any line. One need only sense the joy once to feel its lure.—R. L. Wilbur.

LINITIS PLASTICA

WITH REPORT OF CASE *

GILBERT M. BARRETT, M.D.
SAN FRANCISCO

History.—Mrs. J. F. W., aged 39, housewife, married, was troubled with disturbance of digestion for five or six years. Her husband died of cancer of the stomach. Her father did not have a "strong stomach." Both the father and the mother were troubled with hemorrhoids. The mother had "similar symptoms to daughter," she declared. The mother had recently died of valvular cardiac disease. The father was living and well. The patient was born in Nagasaki, Japan, and lived there until she was 16. When a girl of 16 or 17, she had attacks of "gas in the bowels." She had pneumonia. She was a singer, a strong swimmer, and athletic. She married at 21, and had three children, and a strenuous married life for twelve years. One child died of diphtheria at the age of 6 years. In 1905 the patient was operated on for trouble with the appendix, uterus and tubes and for the purpose of repair.

Present Illness.—The patient complained of gas on the stomach and indigestion, and a "fluttering in her heart" affecting "circulation and breathing." These attacks sometimes came on every two or three months, and occasionally every month for two or three months. If she ate heartily at night or after a long trip, an attack was sure to come on. One of her worst attacks came after eating ripe cherries. She was accustomed to go to St. Helena for rest and massage about once a year. She seemingly improved temporarily, but along with that for about five years she suffered gradual loss of weight, losing 17 pounds. She had attacks of gas and pain, and was given light diet and a digestant and improved. She rarely ate breakfast, and cared not at all for cereals. Chops and French-fried potatoes and asparagus formed a satisfactory meal, and 1911 and 1912 were the best years she had since becoming ill. Roentgenograms, when I first saw the patient in 1912, did not show any such condition as the second plates, which were made in June, 1913. Then in May, after another visit to St. Helena, she came again. There was little vomiting after taking food. Another Roentgen examination was made in June, 1913. There was not food in the stomach long enough to secure a specimen after twenty-five minutes. The patient's muscles had been soft and flabby for the last year. There were no tarry stools. The patient took little food at the last. There was no food which would suit the patient or digest. The abdomen was swollen. She said that she "could taste a secretion at times seeming to come from the esophagus." There was no disturbance of the urinary function. She had some gas, which was worse at times, but not at the same time daily. She had no headache except at times. Dyspnea was present during some attacks but not during all. During the period from October, 1912, to June, 1913, I did not see the patient, as she was feeling a little better, or at least thought she was.

Physical Examination.—The patient walked in for the first examination, looking a trifle pale, and somewhat thinner than she should be. Her principal complaint was an "indi-

* Read before the San Francisco County Medical Society, St. Luke's Hospital program, Dec. 7, 1915.

gestion pain" with a fluttering in her chest. There was no disease of the nervous system, nor any history pointing thereto. The head, throat, teeth, mouth, chest and heart were negative. The abdomen was no more prominent below the navel than normal; in fact, the patient had a flat abdomen with no areas of dulness in the flanks or in the hypogastrium on percussion. It was slightly tender in the epigastric region, but no mass could be felt, nor was any marked resistance noted. Roentgenoscopy at this time revealed an apparently normal stomach in outline with a questionable filling defect on the greater curvature. There was rather rapid emptying of the stomach. There was nothing absolutely definite as to organic disease.

Fig. 2.—Microscopic appearance of cancer cells in muscularis.

Course.—The patient at this time would have nothing done to enlighten us further as to her condition, and we were forced to allow her to go home without a diagnosis, except the tentative one of a possible malignancy (which was told her husband), this view being considered tenable because of her loss of weight, the persistence of symptoms of gastric type and origin, and the Roentgen findings. Against that was the length of time she had these or similar attacks, five or six years and even more, her practically normal blood picture, and her apparent improvement under rest and massage and frequent small meals. The second time she was seen in bed, the facies drawn and the skin slightly wrinkled; she appeared anemic, more so than the blood count seemed to warrant, though with the concentration of the blood, because of a slow circulation and lessened fluid intake, the blood picture was somewhat misleading. There was a marked prominence of the abdomen, owing to the pressure of gas in the intestines and fluid free in the abdomen. The eyes and ears were normal, the teeth in excellent condition and the nose and fauces normal. The limbs were rather thin, and the musculature was flabby. This was in striking contrast to her former perfect physical development. The examination of the chest revealed nothing in the respiratory apparatus; the heart was in the normal position; the heart sounds were normal; the rhythm was normal except during attacks of distention when the pressure of gas in the bowels and stomach caused the heart to "flutter." The girth of the abdomen was increased; no mass was palpable, but fluid fluctuation could be elicited with a shifting dulness with changes in position. On Roentgen examination at this time the stomach emptied in ten minutes and appeared as a small shrunken tubelike organ, high up in the abdomen.

Though no tumor mass could be found, there was a resistance on palpation in the upper abdomen extending across just above the umbilicus, with tenderness over all the epigastrium with a gurgling which seemed to stop about the hepatic flexure of the large intestine, though we could not determine definitely that the delay of feces and gas occurred in the large intestine. The patient entered the hospital June 5, 1914. The temperature varied from 95.6 F. on entrance to 99 before operation, and the pulse from 88 to 100. The urine was slightly cloudy, amber, acid, specific gravity 1.008, no sugar, a slight trace of albumin, few pus cells, few epithelial cells, no casts, and no blood. The Wassermann reaction was negative. The blood examination revealed: red cells, 4,250,000; hemoglobin, 87 per cent.; white cells, 11,000. Blood pressure was 119 mm. Hg. On gastric analysis, hydrochloric acid was absent. Lactic acid was present. There were no Boas-Oppler bacilli. The digestion appeared to be disturbed not so much by the character of the food as by any large quantity. There was no occult blood in the stools.

Operation and Result.—At operation the stomach appeared to all observers to be involved in a malignant growth, the omentum being shrunken and shortened and the glands large and hard. The transverse colon was a thick hard tube, rigid and unyielding. There was much fluid free in the abdomen; no growth resulted on culture from the fluid. The cecum and ascending colon to the hepatic flexure were normal, and the descending colon and sigmoid and rectum were not involved in the disease. No area large enough was found for making a gastro-enterostomy, and the patient's condition did not warrant a resection of the stomach and transverse colon. The abdomen was closed, and a few days later a shortcircuiting operation was to be made; but the patient was so distended with gas by this time, the obstruction at the hepatic flexure having become acute, that a cecostomy was done to relieve the obstructive symptoms with a cecosigmoidostomy to be later added to shortcircuit the diseased transverse colon; but the patient succumbed within two days.

Microscopic specimens showed, after many serial sections, a muscle wall studded with cancer cells, the malignant cells lying thickly between the muscle fibers. The mucosa was not much altered, and the serosa only slightly thickened. From the microscopic findings, the diagnosis of scirrhous cancer of the stomach was made. The transverse colon showed grossly the same changes as the stomach, being an irregularly contracted tube with thick unyielding walls, the caliber barely enough to admit the middle finger.

Fig. 3.—Thickening of wall of transverse colon at hepatic flexure.

COMMENT

Differentiation must be made from the usual and unusual disorders causing or associated with gastric disturbances: constitutional disorders, renal, cardiac, respiratory, hepatic and blood diseases. Also consideration must be given to other conditions which may give pain in a similar location, or even definite gastric symptoms, such as tabes, spinal disease, syphilis, abdominal arteriosclerosis, thoracic or abdominal aneurysm, plumbism and herpes zoster.

Differentiation from a syphilitic stomach must be made. As already mentioned, the syphilitic stomach is seen in younger patients, as a rule. The history, while similar in some respects, may or will differ in a positive history of some of the symptoms of syphilis, primary or secondary. A Wassermann test will show the true status (if repeated) in the acquired type. A history of hydrocephalus or other abnormal development, the teeth, adenopathy, etc., will serve to lead to the proper diagnosis in the congenital type. Roentgenoscopy will not furnish much help, for the appearance of a syphilitic stomach is very similar to a leather-bottle stomach, and the improvement in the general health under antisyphilitic treatment, with the restoration to normal of the stomach function and contour, will be convincing.

DIAGNOSIS

In patients from the third and fourth decade and on, there is an extended history of digestive disturbances without the typical ulcer or malignant symptoms; the latter are usually delayed till later. Or there is an abrupt onset of marked symptoms of gastric origin and type, sometimes the patient dating perfectly the onset of distress to the day, and occasionally to the hour.

If seen late, the patient is unable to take a full meal, and the amount of food found after a test meal is very small, sometimes none after from ten to twenty-five minutes. The hypochlorhydria or achlorhydria are not distinctive of this any more than in the more rapid forms of malignancy, if as much so, as it may be due to a true carcinoma or achylia gastrica.

The screen and plates will show, late in the disease, and most of these patients come late, whether the onset is slow or abrupt, the diminished size, the thickened and unyielding wall of the stomach and even the colon, when involved. The bismuth meal runs rapidly through the thickened tubelike stomach. In our case it required only eight or ten minutes for the stomach to be completely empty.

The usual annular deformity of the carcinoma of the pylorus, or the irregular indented outline of the carcinoma of the body are wanting.

Delirium and Convulsions After Neosalvarsan.—Langevin's patient had been given for four weeks an intravenous injection of a mercury salt five days of the week; the sixth day neosalvarsan was injected, the doses increasing from 0.15 to 0.6 gm. in the four doses that had been given. Convulsions, unconsciousness and delirium developed three days after the fourth dose. The clinical picture was exactly like that of the serous apoplexy which has been known to develop under salvarsan and to subside under epinephrin treatment. The delirium was of the delirium tremens type, coming on as the young man came out from the coma, and keeping up for several days. Venesection was done at once after which there were no further convulsions. During the four days of coma a quart of boiled water was injected slowly into the intestine every hour, and the man recovered. The case was published in the *Bull. et mém. Soc. méd. hôp. de Paris*, 1916, p. 647.

THE EFFECT OF ACTIVITY ON THE HISTOLOGIC STRUCTURE OF NERVE CELLS *

R. A. KOCHER, A.B., M.D.
SAN FRANCISCO

It has long been known that prolonged activity of mucous gland cells results in characteristic histologic changes in these cells, owing to the disappearance from the cell of certain granules (zymogen granules). This granular material is evidently used to make organic material of the secretion. It was doubtless on the basis of such observations that certain physiologists were led to seek for similar alterations in the highly specialized nerve cell following functional activity. Many of the investigations of these physiologists were confined to one or two experiments, the material was often not sufficiently controlled by normal tissue for comparison, and frequently the histologic technic was faulty.

There is the utmost divergence of opinion as to the nature of the changes taking place in nerve cells following activity, and one who tries to correlate the findings of the different workers in this field is utterly confused. The chief findings relate to (*a*) size of cell body and nucleus, and (*b*) amount and distribution of chromatic material. While one group of workers concludes that fatigue results in decrease in the size of cell and nucleus (Hodge, Van Durmé, Legendre), another group finds an increase in the size or change in the nucleus plasma relation. Lambert noted no change in the size of cell or nucleus. Increase in chromatic substance (hyperchromatism) as the chief result of fatigue has been noted by Nissl. Most workers, Van Durmé, Vas Lugaro and Mann, have described a decrease in chromatic material as the result of exercise. Dolley tried to reconcile these contradictions by regarding the hyperchromatism as a result of moderate activity, and the hypochromatism the result of excessive activity or exhaustion. He found that both stages may be found in the same animal simultaneously. Other changes, such as wandering of the nucleus toward the periphery of the cell, rupture of the nuclear and cell membranes (karolysis and karyorhexis) have been described. Dolley noted thirteen stages of cell change from the hyperchromatism to disintegration or death of the cell, corresponding to the degrees of moderate activity up to complete exhaustion. Such divergence in the results is not so surprising when we stop to consider the complicating factors necessarily attending these experiments, such as (1) difficulty of separating the effects of normal activity from unavoidable shock or injury to the nervous system in killing the animal (the nervous system does not "die" as soon as the heart stops beating); (2) postmortem changes ensuing between the time of death and complete penetration of the tissue by the fixing agent owing to the action of autolytic enzymes present in all tissue; (3) varying chemical action of fixing agents; for example, formaldehyd coagulates protein by combination with the amino groups, alcohol by dehydration, sublimate by formation of salts, etc.; (4) the solvent action of materials used in fixation and in embedding, for example, alcohol, xylene, paraffin; (5) varying

* From the Henry Phipps Institute of Psychiatry, the Johns Hopkins Medical School, Baltimore, and the George Williams Hooper Foundation for Medical Research, University of California Medical School.

* The data and other details of these experiments will be reported shortly in the Journal of Comparative Neurology.

effects of chemical reaction between basic or acid dyes used in staining and the different cell structures, and (6) effect of subjecting tissue to temperatures of from 50 to 54 C. (122 to 129.2 F.) in the paraffin oven for a period of several hours.

I have studied the effect of various grades of activity on nerve cells in a series of fifteen separate experiments. The animals used were dogs, cats, pigeons, sparrows, frogs and rats. Every experiment was carefully controlled by a resting animal of the same species, of the same approximate age and size, and the material from the two given identical treatment, except for the activity. The nerve cells studied were from the cruciate gyrus, from the cerebellum and the anterior horn of the spinal cord, and from the dorsal ganglia. In one of the experiments, over 3,500 nerve cells, classified into thirteen types according to the histologic characters, were counted to determine the relative frequency of characteristics which might be correlated with grades of activity.

In this series of experiments I attempted as much as possible to minimize the formation of artefacts, having in mind the above mentioned considerations. It was hoped that by using special care in the handling of material, the use of improved technic in fixation and staining by varying the kind and degree of activity in a long series of experiments, using different animals and studying various kinds of nerve cells, some degree of uniformity of results might be obtained. A resting control animal was used in each experiment. The animals were killed in most cases by bleeding after ether anesthesia, the nerve material removed as quickly as possible, cut into small pieces, and the control and fatigue specimens placed in the same fixing solution, embedded side by side in the same block of paraffin, cut with the same stroke of the knife, mounted and stained together on the same slide. In all fifteen experiments were performed. A great many forms of activity were used; normal activity, forced activity, activity resulting from electric stimulation, both faradic and galvanic, chemical stimulation, and shock being applied in the experiments. The microscopic technic used was varied considerably, not only as to the fixative but also as to staining fluid. The stain most frequently used was Held's modification of Nissl's method.

The examination of the material for comparison was facilitated by having both control and fatigue specimens mounted on the same slide. Changes such as have been previously described as resulting from fatigue were carefully examined for comparative amounts and distribution of chromatic substance, size of granules, nucleus plasma relation, relative size of cells and nuclei, etc. In order to determine whether any change in the size of the cell had resulted from activity, a large series of camera lucida drawings was made. These drawings were made of cells without selection. A field was taken, and every cell showing a nucleolus was included. This precaution was necessary in order to be assured that the cell was cut through the center. Cells were first drawn, a low power for orientation being used, each cell numbered on the paper, then the one-sixth or the one-twelfth objective was used to project the cell, care being taken to draw always at the same distance from the microscope. Over a thousand cells and nuclei were measured by computing the areas of the projected outline with the planimeter.

CONCLUSIONS

There could be found no constant difference in the size of the nerve cells or nuclei resulting from activity. An apparent difference in size which appeared here and there on counting a small number of cells was shown on enlarging the series to be counterbalanced by a similar variation on the part of the controls. Hence it must be concluded that any difference in size of cells found was within the limits of normal variation.

Furthermore, in no experiment did the histologic structure of the nerve cell following activity, even to the point of exhaustion, show any constant deviation from that of the corresponding resting cells of the controls.

Some very sweeping generalizations have been drawn from the conclusions of previous workers; namely, that fatigue, fear, shock and exhaustion may lead to permanent damage and even disintegration of nerve cells. Crile's present theory of surgical shock and of certain aspects of exophthalmic goiter, based essentially on these assumptions, may be cited to show to what extremes these deductions have led.

THE NATURE, MANNER OF CONVEYANCE AND MEANS OF PREVENTION OF INFANTILE PARALYSIS *

SIMON FLEXNER, M.D.
Director of Laboratories of The Rockefeller Institute for Medical Research
NEW YORK

The Rockefeller Institute for Medical Research has been appealed to by so many physicians and laymen for information and advice on the subject of infantile paralysis that it has seemed desirable to relate the facts of present knowledge concerning certain highly pertinent aspects of the disease, together with deductions of practical importance derived from them.

Nature.—Infantile paralysis is an infectious and communicable disease which is caused by the invasion of the central nervous organs—the spinal cord and brain—of a minute, filterable micro-organism which has now been secured in artificial culture and as such is distinctly visible under the higher powers of the microscope.

Location of the Micro-Organism or Virus in the Sick.—The virus of infantile paralysis, as the micro-organism causing it is termed, exists constantly in the central nervous organs and on the mucous membrane of the nose and throat and of the intestines in persons suffering from the disease; it occurs less frequently in the other internal organs, and it has not been detected in the general circulating blood of patients.

Location of the Virus in Healthy Persons.—Although the micro-organism of infantile paralysis is now known, the difficulties attending its artificial cultivation and identification under the microscope are such as to make futile the employment of ordinary bacteriologic tests for its detection. Nevertheless, the virus can be detected by inoculation tests on monkeys, which animals develop a disease corresponding to infantile paralysis in human beings. In this manner the fact has been determined that the mucous membrane of the nose and throat of healthy persons who

* Presented to the New York Academy of Medicine July 12, 1916.
* For Discussion see p. 310.

have been in intimate contact with acute cases of infantile paralysis may become contaminated with the virus, and that such contaminated persons, without falling ill themselves, may convey the infection to other persons, chiefly children, who develop the disease.

Relation of Virus to Types of the Disease.—The virus has, apparently, an identical distribution irrespective of the types or severity of cases of infantile paralysis. Whether the cases correspond with the so-called abortive forms of the disease in which definite paralysis of the muscles does not occur at all, or is so slight and fleeting as often to escape detection; whether they correspond with the meningeal forms in which the symptoms resemble those of acute meningitis with which muscular paralysis may or may not be associated; or whether they consist of the familiar paralytic condition, the virus is present not only within the nervous organs, but also on the mucous membranes of the nose, throat and intestines.

Escape of the Virus from the Body.—Microorganisms which convey disease escape from the body of an infected individual in a manner enabling them to enter and multiply within fresh or uninfected individuals in such a manner as to cause further disease. The virus of infantile paralysis is known to leave the infected human body in the secretions of the nose, throat and intestines. It also escapes from contaminated healthy persons in the secretions of the nose and throat. Whether it ever leaves the infected body in other ways is unknown. At one time certain experiments seemed to show that biting insects, and particularly the stable fly, might withdraw the virus from the blood of infected persons and inoculate it into the blood of healthy persons. But as the virus has never been detected in the blood of human beings, and later experiments with the stable fly have not confirmed the earlier ones, this means of escape of the virus must be considered doubtful. On the other hand, it has been shown by experiments on animals, so that the same facts should be regarded as applicable to human beings, that the virus seeks to escape from the body by way of the nose and throat, not only when inoculation takes place through these membranes, but also when the inoculation is experimentally made into the abdominal cavity, the blood, or the brain itself. From this it is concluded that the usual means of escape of the virus is by way of the ordinary secretions of the nose and throat and, after swallowing these, with the discharges of the intestines.

Entrance of the Virus into the Body.—The virus enters the body, as a rule if not exclusively, by way of the mucous membrane of the nose and throat. Having gained entrance to those easily accessible parts of the body, multiplication of the virus occurs there, after which it penetrates to the brain and spinal cord by way of the lymphatic channels which connect the upper nasal mucous membranes with the interior of the skull. Whether the virus ever enters the body in any other way is unknown. Certain experiments already referred to make it possible that it may be inoculated into the blood by insects, and other experiments have shown that under peculiar and extraordinary conditions, it may in monkeys enter through the intestines. But while the latter two modes of infection may operate sometimes, observations in human cases of infantile paralysis and on animals all indicate that the main avenue of entrance of the virus into the body is by way of the upper respiratory mucous membrane, that is, the membrane of the nose and throat.

Resistance of the Virus.—The physical properties of the virus of infantile paralysis adapt it well for conveyance to the nose and throat. Being contained in their secretions, it is readily distributed by coughing, sneezing, kissing, and by means of fingers and articles contaminated with these secretions, as well as with the intestinal discharges. Moreover, as the virus is thrown off from the body mingled with the secretions, it withstands for a long time even the highest summer temperatures, complete drying, and even the action of weak chemicals, such as glycerin and phenol (carbolic acid), which destroys ordinary bacteria. Hence mere drying of the secretions is no protection; on the contrary, as the dried secretions may be converted into dust which is breathed into the nose and throat, they become a potential source of infection. The survival of the virus in the secretions is favored by weak daylight and darkness, and hindered by bright daylight and sunshine. It is readily destroyed by exposure to sunlight.

Conveyance by Insects.—Since epidemics of infantile paralysis always arise during the period of warm or summer weather, they have been thought of as possibly being connected with or dependent on insect life. The blood-sucking insects have especially come under suspicion. Experiments have been made with biting flies, bedbugs, mosquitoes, and with lice. Neither mosquitoes nor lice seem able to take the virus from the blood of infected monkeys or to retain it for a time in a living state. In one instance, bedbugs have been made to take up the virus from the blood of monkeys, but they did not convey it by biting to healthy monkeys. Certain experiments did indicate that the biting stable fly could both withdraw the virus from the blood of infected and reconvey it to the blood of healthy monkeys, which became paralyzed. But more recent studies have failed to confirm the earlier ones. Moreover, experimentally inoculated monkeys differ in one way from human beings suffering from infantile paralysis, for while the virus may appear in the blood of the former, it has never been detected in the blood of the latter. The ordinary or domestic fly may become contaminated with the virus contained in the secretions of the body and serve as the agent of its transportation to persons and to food with which it comes into contact. Domestic flies experimentally contaminated with the virus remain infective for forty-eight hours or longer. While our present knowledge excludes insects from being active agents in the dissemination of infantile paralysis, they nevertheless fall under suspicion as being potential mechanical carriers of the virus of that disease.

Conveyance by Domestic Animals.—The attention which the recent epidemic of infantile paralysis has drawn to the diseases attended by paralysis has led to the discovery that domestic animals and pets are subject to paralytic diseases. The animals which have especially come under suspicion as possibly distributing the germ of infantile paralysis are poultry, pigs, and dogs and cats. But in isolated instances, sheep, cattle and even horses have been suspected. All these kinds of animals are subject to diseases in which paralysis of the legs and other parts of the body sometimes appear. In not a few instances, paralytic diseases among poultry or pigs have been noted to coincide with the appearance of cases of infantile paralysis on a farm or in a community. Experimental studies have, however, excluded the above-mentioned animals from being carriers of the virus of infantile

paralysis. The paralytic diseases which they suffer have long been known and are quite different from infantile paralysis. Their occurrence may be coincidental; in no instance investigated has one been found to be responsible for the other.

Routes of Travel.—Studies carried out in various countries in which infantile paralysis has been epidemic all indicate that, in extending from place to place or point to point, the route taken is that of ordinary travel. This is equally true whether the route is by water or land, along a simple highway or the line of a railroad. In other words, the evidence derived from this class of studies confirms the evidence obtained from other sources in connecting the distributing agency intimately with human beings and their activities.

Survival of the Virus in the Infected Body.—The virus of infantile paralysis is destroyed in the interior of the body more quickly and completely than, in some instances, in the mucous membrane of the nose and throat. It has been found in monkeys, in which accurate experiments can be carried out, that the virus may disappear from the brain and spinal cord within from a few days to three weeks after the appearance of the paralysis, while at the same time it is still present on the mucous membranes mentioned. The longest period after inoculation in which the virus has been detected in the mucous membrane of the nose and throat of monkeys is six months. It is far more difficult to detect the human than the monkey carriers of the virus since, as directly obtained from human beings, the virus displays a low degree of infectivity for monkeys; while once adapted to monkeys, the virus becomes incredibly active, so that minute quantities are capable of ready detection by inoculation tests. Yet in an undoubted instance of the human disease, the virus was detected in the mucous membrane of the throat five months after its acute onset. Hence we possess conclusive evidence of the occurrence of occasional chronic human carriers of the virus of infantile paralysis.

Fluctuation in Epidemics.—Not all epidemics of infantile paralysis are equally severe. Indeed, great variations or fluctuations are known to occur not only in the number of cases, but also in the death rate. The extremes are represented by the occasional instances of infantile paralysis known in every considerable community and from which no extension takes place, and the instances in which in a few days or weeks the number of cases rises by leaps and bounds into the hundreds, and the death rate reaches 20 per cent. or more of those attacked. While all the factors which determine this discrepancy are not known, certain of them have become apparent. A factor of high importance is the infective power or potency, or, technically stated, the virulence, of the micro-organism or virus causing the disease. This virus is subject to fluctuations of intensity which can best be illustrated by an example. The virus as ordinarily present in human beings even during severe epidemics has low infective power for monkeys. But by passing it from monkey to monkey, it tends to acquire after a variable number of such passages an incredible activity. However, occasional samples of the human virus refuse to be thus intensified. But once rendered highly potent, the virus may be passed from monkey to monkey through a long but not indefinite series. Finally, in some samples of the virus at least a reverse change takes place — the virus begins to lose its virulence until it returns to the original or even to a diminished degree of infective power. In this respect the behavior of the virus corresponds to the onset, rise and then the fall in number and severity of cases as observed in the course of epidemics of infantile paralysis and other epidemic diseases. Hence either a new active specimen of the virus may be introduced from without which, after a certain number of passages from person to person, acquires a high potency; or a specimen of virus already present and left over from a previous epidemic after a resting period and similar passages again becomes active, and reaches an infective power which equals or even exceeds that originally possessed. Another but more indefinite factor relates to the degree of susceptibility among children and others affected, which at one period may be greater or less than at another.

Varying Individual Susceptibilities.—Not all children and relatively few adults are susceptible to infantile paralysis. Young children are more susceptible, generally speaking, than older ones; but no age can be said to be absolutely insusceptible. When several children exist in a family or in a group, one or more may be affected, while the others escape or seem to escape. The closer the family or other groups are studied by physicians, the more numerous it now appears are the number of cases among them. This means that the term "infantile paralysis" is a misnomer, since the disease arises without causing any paralysis whatever, or such slight and fleeting paralysis as to be difficult of detection. The light or abortive cases, as they are called, indicate a greater general susceptibility than has always been recognized, and their discovery promises to have far reaching consequences in respect to the means employed to limit the spread or eradicate foci of the disease.

Period of Incubation.—Like all other infectious diseases, infantile paralysis does not arise at once after exposure, but only after an intervening lapse of time called the period of incubation. This period is subject to wide limits of fluctuation: in certain instances it has been as short as two days; in others it has been two weeks or possibly even longer. But the usual period does not exceed about eight days.

Period of Infectivity.—Probably the period at which the danger of communication is greatest is during the very early and acute stage of the disease. This statement must be made tentatively since it depends on inference, based on general knowledge of infection, rather than on demonstration. Judging from experiments on animals, the virus tends not to persist in the body longer than four or five weeks, except in those exceptional instances in which chronic carriage is developed. Hence cases of infantile paralysis which have been kept under supervision for a period of six weeks from the onset of the symptoms may be regarded as practically free of danger.

Protection by Previous Attack.—Infantile paralysis is one of the infectious diseases in which insusceptibility is conferred by one attack. The evidence derived from experiments on monkeys is conclusive in showing that an infection which ends in recovery gives protection from a subsequent inoculation. Observations on human beings have brought out the same fact, which appears to be generally true, and to include all the forms of infantile paralysis, namely, the paralytic, meningeal or abortive, which all confer immunity.

Basis of the Immunity.—The blood of normal persons and monkeys is not capable of destroying or neutralizing the effect of the virus of infantile paraly-

sis. The blood of persons or monkeys who have recovered from the disease is capable of destroying or neutralizing the effect of the virus. The insusceptibility or immunity to subsequent infection, whether occurring in human beings after exposure or monkeys after inoculation, rests on the presence of the destroying substances, the so-called immunity bodies, which arise in the internal organs and are yielded to the blood. So long as these immunity bodies persist in the body, protection is afforded; and their presence has been detected twenty years or even longer after recovery from infantile paralysis. Experiments have seemed to show that the immunity bodies appear in the blood in the course of even the mildest attack of the disease, which fact explains why protection is afforded irrespective of the severity of the case.

Active Immunization.—Protection has been afforded monkeys against inoculation with effective quantities of the virus of infantile paralysis by previously subjecting them to inoculation with subeffective quantities or doses of the virus. By this means and without any evident illness or effect of the protective inoculation, complete immunity has been achieved. But the method is not perfect, since in certain instances not only was immunity not obtained, but unexpected paralysis intervened. In the instances in which protection was accomplished, the immunity bodies appeared in the blood.

Passive Protection.—By transferring the blood of immune monkeys to normal or untreated ones, they can be rendered insusceptible or immune, and the immunity will endure for a relatively short period during which the passively transferred immunity bodies persist. The accomplishment of passive immunization is somewhat uncertain, and its brief duration renders it useless for purposes of protective immunization.

Serum Treatment.—On the other hand, a measure of success has been achieved in the experimental serum treatment of inoculated monkeys. For this purpose blood serum derived either from recovered and protected monkeys or human beings has been employed. The serum is injected into the membranes about the spinal cord, and the virus is inoculated into the brain. The injection of serum must be repeated several times in order to be effective. Use of this method has been made in a few instances in France, where the blood serum derived from persons who had recovered from infantile paralysis has been injected into the spinal membranes of persons who have just become paralyzed. The results are said to be promising. Unfortunately, the quantity of the human immune serum is very limited, and no other animals than monkeys seem capable of yielding an immune serum, and the monkey is not a practicable animal from which to obtain supplies.

Drug Treatment.—The virus of infantile paralysis attacks and attaches itself to the central nervous organs. Hence it is not only reached with difficulty because nature has carefully protected those sensitive organs from injurious materials which may gain access to the blood, but it must also be counteracted by substances and in a manner that will not themselves injure those sensitive parts. The ideal means to accomplish this purpose is through the employment of an immune serum, since serums are among the least injurious therapeutic agents. The only drug which has shown any useful degree of activity is hexamethylenamin, which is itself germicidal, and has the merit of entering the membranes, as well as the substance of the spinal cord or brain in which the virus is deposited. But experiments on monkeys have shown this chemical to be effective only very early in the course of the inoculation and only in a part of the animals treated. Efforts to modify and improve this drug by chemical means have up to the present been only partially successful. The experiments have not yet reached the point at which the drugs are applicable to the treatment of human cases of infantile paralysis.

PRACTICAL DEDUCTIONS AND APPLICATIONS

1. The chief mode of demonstrated conveyance of the virus is through the agency of human beings. Whether or not still other modes of dissemination exist is unknown. According to our present knowledge, the virus leaves the body in the secretions of the nose and throat and in the discharges from the intestines. The conveyers of the virus include persons ill of infantile paralysis in any of its several forms and irrespective of whether they are paralyzed or not, and such healthy persons who may have become contaminated by attendance on or association with the ill. How numerous the latter class may be is unknown. But all attendants on or associates of the sick are suspect. These healthy carriers rarely themselves fall ill of the disease; they may, however, be the source of infection in others. On the other hand, the fact that infantile paralysis is very rarely communicated in general hospitals to other persons, whether doctors, nurses or patients, indicates that its spread is subject to ready control under restricted and supervised sanitary conditions.

2. The chief means by which the secretions of the nose and throat are disseminated is through the act of kissing, spitting, coughing or sneezing. Hence, during the prevalence of an epidemic of infantile paralysis, care should be exercised to restrict the distribution as far as possible through these common means. Habits of self-denial, care, and cleanliness and consideration for the public welfare can be made to go very far in limiting the dangers from these sources.

Moreover, since the disease attacks by preference young children and infants, in whom the secretions from the nose and mouth are wiped away by mother or nurse, the fingers of these persons readily become contaminated. Through attention on other children or the preparation of food which may be contaminated, the virus may thus be conveyed from the sick to the healthy. The conditions which obtain in a household in which a mother waits on the sick child and attends the other children are directly contrasted with those existing in a well ordered hospital: the one is a menace, the other a protection to the community. Moreover, in homes the practice of carrying small children about and comforting them is the rule, through which not only the hands, but other parts of the body and the clothing of parents may become contaminated.

3. Flies also often collect about the nose and mouth of patients ill of infantile paralysis and feed on the secretions, and they even gain access to the discharges from the intestines in homes unprotected by screens. This fact relates to the domestic fly, which, becoming grossly contaminated with the virus, may deposit it on the nose and mouth of healthy persons, or on food or eating utensils. To what extent the biting stable fly is to be incriminated as a carrier of infection is doubtful; but we already know enough to wish to exclude from the sick, and hence from menacing the well, all objectionable household insects.

Food exposed to sale may become contaminated by flies or from fingers which have been in contact with secretions containing the virus; hence food should not be exposed in shops, and no person in attendance on a case of infantile paralysis should be permitted to handle food for sale to the general public.

4. Protection to the public can best be secured through the discovery and isolation of those ill of the disease, and the sanitary control of those persons who have associated with the sick and where business calls them away from home. Both these conditions can be secured without too great interference with the comforts and the rights of individuals.

In the first place, where homes are not suited to the care of the ill so that other children in the same or adjacent families are exposed, the parent should consent to removal to hospital in the interest of the sick child itself, as well as in the interest of other children. But this removal or care must include not only the frankly paralyzed cases, but also the other forms of the disease. In the case of doubtful diagnosis, the aid of the laboratory is to be sought, since even in the mildest cases changes will be detected in the cerebrospinal fluid removed by lumbar puncture. If the effort is to be made to control the disease by isolation and segregation of the ill, then these means must be made as inclusive as possible. It is obvious that in certain homes isolation can be carried out as effectively as in hospitals.

But what has been said of the small incidence of cases of the disease among the hospital personnel, and those with whom they come into contact, indicates the extent to which personal care of the body by adults and responsible people can diminish the menace which those accidentally or unavoidably in contact with the ill are to the community. Care exercised not to scatter the secretions of the nose and throat by spitting, coughing and sneezing, the free use of clean handkerchiefs, cleanliness in habits affecting especially the hands and face, changes of clothes, etc., should all act to diminish this danger. But in the end, the early detection and isolation of the cases of infantile paralysis in all of its forms, with the attendant control of the households from which they come, will have to be relied on as the chief measure of staying the progress of the epidemic.

5. The degree of susceptibility of children and other members of the community to infantile paralysis is relatively small and is definitely lower than to such communicable diseases as measles, scarlet fever and diphtheria. This fact in itself constitutes a measure of control; and while it does not justify the abatement of any practicable means which may be employed to limit and suppress the epidemic, it should tend to prevent a state of overanxiety and panic from taking hold of the community.

6. A percentage of persons, children particularly, die during the acute stage of the disease. This percentage varies from five in certain severe epidemics to twenty in others. The average death rate of many epidemics has been below 10 per cent. A reported high death rate may not be actual, but only apparent, since in every instance the death will be recorded, while many patients who recover may not be reported at all to the authorities. In the present instance it is too early in the course of the epidemic to calculate the death rate, which may prove to be considerably lower than it now seems to be.

7. Of those who survive, a part make complete recoveries, in which no crippling whatever remains. This number is greater than is usually supposed, because it includes not only the relatively large number of slight or abortive cases, but also a considerable number of cases in which more or less of paralysis was present at one time. The disappearance of the paralysis may be rapid or gradual—may be complete in a few days or may require several weeks or months.

The remainder, and unfortunately not a small number, suffer some degree of permanent crippling. But even in this class, the extent to which recovery from the paralysis may occur is very great. In many instances the residue of paralysis may be so small as not seriously to hamper the life activities of the individual; in others in whom it is greater, it may be relieved or minimized by suitable orthopedic treatment. But what it is imperative to keep in mind is that the recovery of paralyzed parts and the restoration of lost muscular power and function is a process which extends over a long period of time — that is, over months and even years. So that even a severely paralyzed child who has made little recovery of function by the time the acute stage of the disease is over, may go on gaining for weeks, months and even years, until in the end he has regained a large part of his losses. Fortunately, only a very small number of the attacked are left severely and helplessly crippled. Lamentable as it is that even one should be so affected, it is nevertheless a reassurance to know that so many recover altogether, and that so much of what appears to be permanent paralysis disappears in time.

There exists at present no safe method of preventive inoculation or vaccination, and no practicable method of specific treatment. The prevention of the disease must be accomplished through general sanitary means; recovery from the disease is a spontaneous process which can be greatly assisted by proper medical and surgical care. Infantile paralysis is an infectious disease, due to a definite and specific micro-organism or virus; recovery is accomplished by a process of immunization which takes place during the acute period of the disease. The tendency of the disease is toward recovery, and it is chiefly or only because the paralysis in some instances involves those portions of the brain and spinal cord which control respiration or breathing and the heart action that death results.

Finally, it should be added that not since 1907, at which time the great epidemic of infantile paralysis of poliomyelitis appeared in this country, has the country or this state or city been free of the disease. Each summer since has seen some degree of accession in the number of cases; the rapid rise in the number of cases this year probably exceeds that of any previous year. But it must be remembered that in 1908, several thousand cases occurred in the greater city — possibly indeed many cases of and deaths due to the disease were never reported as such. Hence the present experience, severe and serious as it is, is not something new; the disease has been severely epidemic before and was brought under control. The knowledge regarding it now is far greater than it was in 1908; and the forces of the city which are dealing with the epidemic are probably better organized and in more general cooperation than ever before. The outlook, therefore, should not be regarded as discouraging.

Dependability.—A drug-taking nation is no stronger than a drug-taking man, and a drug-taking man is not very dependable, either in the factory or on the firing line.—*Health Letter*, Life Extension Institute.

Therapeutics

HEAT EXHAUSTION

The two conditions due to excessive heat, heat exhaustion and sunstroke, vary in their pathology and symptomatology. Heat exhaustion is a condition resulting from prolonged or continuous exposure to indoor heat or to the heat from the sun without direct exposure to the sun's rays. It occurs commonly in engine and furnace rooms, particularly among stokers on ocean steamers, and in foundries. On hot summer days it may even befall those remaining indoors in hot and poorly ventilated rooms.

SYMPTOMS

Heat exhaustion is an asthenic condition, and the symptoms are those of depression. It often results in collapse due to circulatory failure. Not only is there a congestion of blood in the splanchnic vessels with a corresponding depletion of the vessels in the brain and periphery, but also the excessive loss of fluids from the body by way of perspiration causes an increase in the viscosity of the blood. There result vertigo, pallor, at first faintness and weakness, and then prostration, the patient becoming semiconscious or losing consciousness altogether. The hands become clammy, cold perspiration may be present, and the body feels cold. The pulse becomes small and feeble, and the heart action is poor and weak. Often the condition is not allowed to proceed so far, and there are present only the weakness and faintness. With this may also be associated irritability, restlessness and sleeplessness. Occasionally there is delirium. In heat exhaustion there is hypothermia, the temperature falling as low as 95.

TREATMENT

In treating heat exhaustion it must be remembered that there is a depressed and hypothermic condition. Stimulants are indicated, perhaps best as caffein or coffee. Camphor, strychnin and digitalis preparations may be given hypodermically if indicated. If the heart is weak, a hypodermic injection of $\frac{1}{1000}$ grain of atropin sulphate is good treatment. Friction of the extremities, and even dry heat may be advisable. The ice bath is absolutely contraindicated in this condition, as a subnormal temperature already exists. A warm bath will be better tolerated.

SUNSTROKE

In sunstroke the symptoms are due to causes different from those in heat exhaustion. Besides the action of the prolonged high temperature, it is probable that there is some direct action of the rays themselves. In this condition there is a congestion of the blood vessels of the cerebrospinal system and the periphery. This is caused by the effect of the heat directly on the brain. There may be premonitory symptoms, such as headache, restlessness, malaise, nausea, extreme thirst, rapid, shallow breathing, vomiting, and occasionally diarrhea. There also may be frequent micturition, and a hot, dry skin. If the exposure to the sun is continued, the symptoms are aggravated, and with them the face becomes flushed, the pulse full and frequent, and the breathing labored. The temperature may rise to 108, and even to 112 and 113 F.

The pupils are contracted, but become dilated preceding death. Symptoms of cerebral congestion and disturbance of the cerebrospinal centers also manifest themselves. Twitching of the muscles occurs, and often epileptiform convulsions. Later there may result paralysis of the respiratory center. Preceding death there usually is suppression of the urine. Should there be recovery from a severe sunstroke, there may follow partial or complete paralysis, deafness, disturbance of vision or blindness, constant headaches, or dementia.

Lian[1] reports three atypical cases in all of which there were signs of meningeal irritation and lumbar puncture showed the cerebrospinal fluid to be under marked pressure. In one case there was only stupor, and in a second, sudden and acute dilatation of the heart with extreme arrhythmia.

TREATMENT

In sunstroke there will have to be combated the plethoric condition of the veins both at the periphery and in the cerebrospinal system. Besides this an attempt must be made to reduce the high temperature. The subject of the sunstroke should be brought to a cool, shady place, and the clothing loosened or removed. If there is poor respiration, artificial respiration should be resorted to. It must be cautiously done so as not to encourage possible cerebral hemorrhage. In cases of marked plethora, Grober[2] advises venesection, with the withdrawal of from 250 to 400 c.c. of blood. This will also be of assistance in warding off edema of the brain, and when asphyxia due to stagnation of the blood in the lungs has persisted for more than two hours.[3]

For the reduction of the temperature there should be tried a cold bath to which ice is added, or cool effusions. An ice cap should be constantly on the head. Friction of the body with pieces of ice will also be found useful. This should be continued until the temperature has fallen to at least 102. Often stimuli direct to the naked skin will be of service. This may be done by sprinkling the naked trunk with cold water, fanning the body, or by squirting cold carbonated water from a bottle on the body. Cold water enemas may also be tried.

Antipyretics aid in the attempt to reduce the temperature, but they should be used with discretion, and the heart should be carefully watched. The antipyretics that are best are antipyrin or acetphenetidin. These, with the cold water applications, should be continued as long as the high temperature persists.

To aid in the reduction of the cerebral pressure, lumbar puncture should be done. For convulsions or delirium, small doses of some sedative, such as ehloral or the bromids, may be used.

AFTER-TREATMENT

The after-treatment of sunstroke or heat exhaustion is very important. Symptoms of the attack may persist for a long time. The patient should avoid all hot places, particularly those where he would be exposed to the sun. If his condition warrants it, he should bathe frequently in cool or cold water. If there is insomnia, veronal-sodium (sodium diethyl-barbiturate) or chloral may be given. A tonic containing strychnin can also be given. Alcoholic drinks should be avoided. There may be some loss of memory, such as forgetfulness, and headache, or irritability. These, however, usually disappear. Occasionally, when the sunstroke has been of an unusually severe character, there

1. Lian: Presse méd., 1915, xxiii, 556.
2. Grober: Deutsch. med. Wchnschr., 1914, xl, 1.
3. Hiller: Deutsch. med. Wchnschr., 1913, xxxix, 1185.

may remain permanently signs of brain injury, such as impaired memory, dementia, mania, epilepsy or partial paralysis.

HEAT COLLAPSE

A common condition from exposure to the sun, very often seen on hot summer days, is heat collapse. This is often called sunstroke, but it is too transient and mild for sunstroke. It is due to a short exposure to the heat of the sun's rays. There may be a transient unconsciousness; the temperature is normal or slightly elevated, and the respiration shallow and rapid.

Treatment consists in removing the patient to a cool or shady place, loosening the clothing, and spraying the face and body with cold water. He should be given a cup of strong tea or coffee. A hypodermic injection of strychnin or camphor may be needed.

ANTITYPHOID VACCINATION

The military experience of the past two years has tended to confirm the conclusions previously derived from army and hospital statistics during times of peace, concerning the value of antityphoid vaccination as a protective measure against typhoid fever. It has been urged by some that the elimination of typhoid fever from our army following the introduction of antityphoid vaccination was due not so much to vaccination as to improved sanitary conditions. This argument will hardly hold, however, in view of the success in controlling typhoid under the severe conditions of trench warfare on the western front in Europe.

The occurrence of typhoid in isolated instances in vaccinated persons has led some to raise the question as to whether after all vaccination is as efficient as army statistics would indicate. In addition to variations in quality of vaccine, and individual differences in the response to immunization, there are several factors which may influence the degree of immunity acquired by any individual of a series.

Immunity is a relative quality. Resistance in nonimmunized persons is affected by many influences which tend to improve or depress body vigor. This is clearly evident in diseases having a slow onset and course, such as tuberculosis. Individual variation in immunity is seen also even in diseases such as scarlet fever, in which, while one attack usually protects for life, second attacks sometimes occur. Vaccination against smallpox confers a very stable immunity, but even here revaccination at intervals of a few years is found advisable. The duration of immunity conferred by typhoid vaccination is not definitely determined, but there is evidence to show that it may last for five years or more, though probably in a lessening degree. It has been customary to revaccinate at the end of two years, particularly if the persons concerned are liable to be exposed to unusual dangers of typhoid infection. It is said that revaccination every six months has been employed in some of the troops in the present European war.

Finally, the dosage of infected material which the immunized person is called on to withstand is an important factor in determining whether his protection will prove adequate. In nonimmunized civil communities, during epidemics due to infected water supplies, the proportion of persons who contract typhoid fever is only a fraction of the total number who ingest the infected water. This sparing of many of the exposed population is probably due in part to the relatively greater natural immunity of some persons over others who may partake of the same quantities of water, and also in part to the circumstance that some persons take smaller amounts of infected water than others. The relatively greater incidence of typhoid among certain classes of large water drinkers was noted in the epidemic at Ithaca some years ago.

It seems evident, therefore, that the occasional failure of vaccination to protect against typhoid should not be allowed seriously to discredit a method for which the favorable evidence is so convincing.

TYPHOID AND PARATYPHOID

Vaccination against typhoid fever does not seem to protect against infections caused by paratyphoid organisms. During the early months of mobilization in the present war, certain troops were immunized against typhoid only. When these troops entered the field a few months later, typhoid fever was almost entirely absent, but paratyphoid was found in a number of instances. Subsequently paratyphoid vaccine was included with the typhoid for immunization.

Paratyphoid infections are not so common as typhoid, but since the circumstances of infection are similar in these diseases, it is advisable to include paratyphoid A and B with the typhoid organisms in the immunizing vaccine.

DOSAGE

The first dose of vaccine may contain 500 millions of killed typhoid bacilli, 250 millions of paratyphoid A and 250 millions of paratyphoid B. The second and third doses are each double the amount of the first injection, that is, 1,000 millions of typhoid and 500 millions each of paratyphoid A and paratyphoid B. The reactions following the vaccine containing paratyphoid in addition to the typhoid bacilli do not appear to be more severe than those following immunization by typhoid bacilli alone.

The dosage for children is determined by weight rather than by age. Children stand immunization well. For a child of from 8 to 12 years, half the adult dose may be safely given. In very young children the necessity for immunization is much less than in the older children; under ordinary conditions of life their food supply is better controlled and the opportunities for accidental infections are less than in older children whose activities take them into more varied and less sanitary situations.

Examination of Schoolchildren by Private Physicians.—The large number of children to be examined in the public schools and the relatively small medical staff available led the department of health of New York City to allow physical examination of schoolchildren by private physicians if the parent so desired. The cards returned up to Feb. 1, 1916, that is, during the first semester of the school year, totaled 15,606, or 16 per cent. of the total number of children examined during that period. This indicated that about one sixth of the parents had availed themselves of the opportunity to allow a private physician to do public health work. The results of the examinations made by school inspectors and by private physicians have been tabulated for comparison, showing the percentage of defects found in the children examined. Taken as a whole there is a large degree of correspondence between the two sets of figures. There is, however, a high proportion of cardiac, pulmonary, orthopedic and nervous defects found by private physicians. It is estimated that these examinations made by private physicians has meant a saving of nearly $12,000 to the department of health.

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SATURDAY, JULY 22, 1916

CLINICAL CALORIMETRY

It cannot fail to be gratifying to Americans who are interested in the development and progress of the medical sciences to note the superior character as well as the increasing volume of the contributions that are being made from the laboratories of this country. In no field is the excellence and importance of this current scientific research more evident than in the domain of the study of nutrition. There was a time when the problems of metabolism were somewhat neglected for the pursuit of curative drugs or therapeutic serums. Today, however, we can point to substantial contributions to the theories of nutrition and to the knowledge of significant features of food and diet which are fundamental factors in the performance of the body in health or disease.

Prominent among the institutions which deserve credit for their contributions to the science of nutrition is the Russell Sage Institute of Pathology in Affiliation with the Second Medical Division of Bellevue Hospital, New York. For the second time since its inception, the *Archives of Internal Medicine* has devoted a special issue to papers based on investigations in clinical calorimetry.[1] These deal with a variety of topics, some of which depart widely from the questions of immediate physiologic interest and enter the domain of preeminently clinical interest, exemplifying the inevitable conclusion of most observant persons that much of clinical medicine in reality represents pathologic physiology.[2]

Elsewhere in this issue we quote the remark that it is not too much to say that the science of nutrition is founded on the study of the basal energy requirement.[3] The latter, therefore, needs to be fundamentally understood and determinable by adequate methods. Calorimetry has helped to determine the energy needs by showing what the actual expenditures of the body are. To understand and control the processes by which the body temperature is kept normal it has been necessary to discover a means for ascertaining at any time the actual quantities of heat produced and dissipated, and the effect on each factor of different normal and pathologic conditions. This is accomplished by calorimetry. One contribution to the science of metabolism which can be made only by a respiration calorimeter is a comparison of the direct and indirect calorimetry. The former method depends on the direct measurement of the heat of radiation, conduction and vaporization. The latter depends on the measurement of carbon dioxid and oxygen and the calculation of the foodstuffs metabolized each hour. Largely owing to the work of American investigators, it has been demonstrated definitely that the easier indirect method of calorimetry is in such substantial agreement with the direct method as to make it available for practical purposes. Indirect calorimetry has ready clinical application and advantages. It suffices to determine whether metabolism is higher or lower than normal, and thus becomes a guide to treatment and the management of the food supply. Henceforth the less expensive and less laborious technic of indirect calorimetry can be employed as a mode of clinical investigation with the assurance that it will suffice to furnish reliable data regarding the level of metabolism and related factors of importance to the investigator in medicine and to the diagnostician.

The Sage calorimeter has demonstrated,[4] admittedly to the surprise of most students of metabolism, that the metabolism, that is, the energy expenditure, averaged 3 per cent. lower when the subject was in a semireclining position, represented by rest in a steamer chair, than when the subject was at complete rest, flat in bed. Muscular effort obviously increases metabolism; and most records on patients sitting upright or nearly so have shown an increased heat production over the resting condition. But it must be remembered, as Du Bois points out, that in the orthopneic posture either with back rest or steamer chair as used in these calorimeter experiments, there was complete support of the body and head. No more muscular tension was needed than when the subjects were lying flat and the pillows were so arranged that the men could fall asleep without change in posture. It is quite possible that the diminished pressure on the diaphragm lessened the work of breathing enough to account for the lower metabolism. We are reminded that "on steamers, in clubs, and in those parts of our country where laziness is a science, men assume a semireclining posture with the head, back and feet supported on any convenient object. Patients who are very dyspneic are obliged to sit up, and they can sleep only in the semireclining posture. The slight diminution in

1. Clinical Calorimetry, Arch. Int. Med., May, 1915, Part 2; ibid., June, 1916, Part 2. Clinical Calorimetry in the United States, editorial, The Journal A. M. A., June 19, 1915, p. 2068.

2. The contributions of more distinctly clinical bearing will be commented on in a subsequent editorial note.

3. The Basal Metabolism in Obesity, and Its Significance, editorial, The Journal A. M. A., this issue, p. 288.

4. Soderstrom, G. F.; Meyer, A. L., and Du Bois, E. F.: Clinical Calorimetry, Eleventh Paper, A Comparison of the Metabolism of Men Flat in Bed and Sitting in a Steamer Chair, Arch. Int. Med., June, 1916, p. 872.

energy requirement may be a factor in leading them to assume the orthopneic posture, but with many cardiac and nephritic patients this economy is more than offset by increased muscular activity." At any rate, it is of no little interest to appreciate that the semireclining position which so many patients are required to assume for long periods represents no excessive expenditure of energy.

Fundamental researches on the basal energy requirement of adult man and of the young infant are now available.[5] The facts regarding certain of the years of the intervening period are desirable because of the unique physiologic changes going on. Thus in boys the years immediately preceding puberty are of special interest. By this time the figure has lost most of its childish characteristics and the mind has reached a point of great intelligence. Although the individual has scarcely passed the half-way mark in the years of growth, and has attained only half his future weight, yet he resembles the adult much more than he resembles the infant. At this stage the sex glands have not yet begun the rapid development of puberty with its profound effect on the whole organism. Curiously enough there is a sudden increase in the rate of growth which takes place at this time. In fact, we may consider boys in the period of prepubescence as individuals of adult form but of small size, growing rapidly, and as yet scarcely influenced by the internal secretions of the sex glands. The new observations with the Sage calorimeter[6] show a distinctly higher metabolism in boys of 12 to 13 years old. The heat production was 25 per cent. above the corresponding adult level. The fact that the metabolism is high, points, says Du Bois, to a specific increase in the metabolism of the growing organism.

Gephart and Du Bois[7] have noted that there are many factors which influence the amounts of water given off by skin and lungs, the most important being the amount of water previously ingested, the amount of clothing, the temperature and humidity of the air and the rise or fall of body temperature. The amounts eliminated in consecutive hours may vary greatly, and even transient emotions may cause sweating. Under the atmospheric conditions of the calorimeter experiments the average water elimination by normal men through the skin and lungs is 28.4 gm. an hour. About 24 per cent. of the heat production is dissipated in the vaporization of water.

5. For the literature on infants, see Benedict, F. G., and Talbot, F. B.: The Gaseous Metabolism of Infants, Carnegie Institution of Washington, Pub. 201, 1914; Studies in the Respiratory Exchange of Infants, Am. Jour. Dis. Child., July, 1914, p. 1. On adults, see Benedict; Emmes, Roth and Smith: The Basal, Gaseous Metabolism of Normal Men and Women, Jour. Biol. Chem., 1914, xviii, 139. Benedict and Roth: The Metabolism of Vegetarians as Compared with the Metabolism of Non-Vegetarians of Like Weight and Height, ibid., 1915, xx, 231. Benedict and Smith: The Metabolism of Athletes as Compared with Normal Individuals of Similar Height and Weight, ibid., p. 243. Benedict and Emmes: A Comparison of the Basal Metabolism of Normal Men and Women, ibid., p. 253. Benedict: Factors Affecting Basal Metabolism, ibid., p. 263. Gephart, F. C., and Du Bois, E. F.: Clinical Calorimetry, Fourth Paper, Arch. Int. Med., May, 1915, p. 835.

6. Du Bois, E. F.: Clinical Calorimetry, Twelfth Paper, The Metabolism of Boys 12 and 13 years Old Compared with the Metabolism at Other Ages, Arch. Int. Med., June, 1916, p. 887.

7. Gephart, F. C., and Du Bois, E. F.: Clinical Calorimetry, Thirteenth Paper, The Basal Metabolism of Normal Adults with Special Reference to Surface Area, Arch. Int. Med., June, 1916, p. 902.

HEREDITARY ANKYLOSIS OF FINGER JOINTS

From some points of view an individual may be regarded as representing a sort of arithmetical mean of both of his parents. There may be a blending of characteristics so that some features of each parent may be found in the offspring considered as a unit organism. In certain respects, however, definite qualities appear to be transmitted from parent to offspring either completely or not at all. Through Mendel's classic experiments and the subsequent enormous development of the study of heredity, it has become possible to formulate the plan in accord with which characteristics are transmitted so that they may appear as dominant in type and frequently manifest themselves, or may continue to be handed down in latent or recessive form until combinations of circumstances now definitely formulated lead to their cropping out. Genetics has become a more representative science than the study of breeding was a generation ago. In medicine, instances of hereditary transmission of bodily peculiarities and well defined structural anomalies have been known for a very long time. Inherited abnormalities of function have been described in growing number in recent years. The more carefully the cases are being studied and the family histories investigated, the larger becomes the number of instances which seem to obey the requirements of the mendelian rules of inheritance.

Illustrative cases of the investigated inheritance of defects, both chemical and morphologic, have been reviewed from time to time in THE JOURNAL. An unusually valuable addition to the literature of hereditary anomalies has been made by Cushing[1] of the Harvard Medical School on the subject of what he terms symphalangism. This is an anomalous malformation of the hand which appears to belong to the category of unit characters that are believed by present day geneticists to be inherited in accordance with mendelian laws. Familial tendencies have already been reported in cases of shortening of the fingers and toes which possessed only one instead of two interphalangeal articulations (hypophalangia or brachydactylism.)[2] The symphalangism of Cushing refers to still another type of familial malformation previously described by Walker[3]

1. Cushing, Harvey: Hereditary Anchylosis of the Proximal Phalangeal Joints (Symphalangism), Genetics, 1916, i, 90.

2. Farabee, W. C.: Inheritance of Digital Malformations in Man, Papers of the Peabody Museum of American Archaeology and Ethnology, Harvard University, 1905, iii, 69. Drinkwater, H.: An Account of a Brachydactylous Family, Proc. Roy. Soc. Edinburgh, 1908, xxvii, 35; Study of a Brachydactylous Family (Minor Brachydactyly), iv, Conférence Internat. de génétique, Paris, 1911, p. 549, Account of a Family Showing Minor Brachydactyly, Jour. Gen., 1912, ii, 21; Minor Brachydactyly, No. 2, ibid., 1914, iii, 217.

3. Walker, G.: Remarkable Cases of Hereditary Anchyloses, or Absence of Various Phalangeal Joints with Defects of the Little and Ring Fingers, Bull. Johns Hopkins Hosp., 1901, xii, 129.

as a particular form of ankylosis involving more especially the midphalangeal joints. Aside from the possession of what the subjects designated as "straight fingers," in contrast to the "crooked fingers" of normal persons, there was no evidence of physical deterioration in the families studied. Cushing has secured records of 452 related individuals reaching into eight generations of the family which he has investigated. Their symphalangism, which is transmissible by either sex, appears in seven generations as a bony ankylosis of the proximal interphalangeal joints of one or more fingers. In its milder degrees, the preaxial (radial) fingers are less likely to be involved than the postaxial. Both hands and feet of the affected individuals may be involved. The trait may be transmitted in its most outspoken form by a parent in whom it is inconspicuous, but never by unaffected parents. Of the children of affected parents, about half were involved. Hence the trait behaves as a simple mendelian dominant with an equal chance, among the offspring of affected individuals, that it will be or will not be inherited.

The preference of inherited malformations of the sort described to manifest themselves in certain phalanges of the second row rather than in others raises interesting questions relating to development. It is suggested that the phenomenon is associated in some way with the late appearance of the ossification centers in this phalangeal row, the last of the three to ossify. There may be inherited inhibitory influences active at the prenatal period to account for these congenital anomalies. Cushing points out, however, that such a suggestion, though possibly explaining the underlying lesion characterizing brachydactyly, will not fully account for the condition with which we are dealing. For though a certain degree of brachydactylism does occasionally appear, the chief characteristic of symphalangism is a joint lesion. Although we do not know what is the chronological succession of development for the interphalangeal joints, it is quite probable that the articulations between the proximal and middle rows of phalanges are the last to be laid down, and that in these individuals an inhibitory influence checks their development at a stage a few days later than that which checks the formation of the ossification centers and produces the shortening of the fingers known as brachydactylism.

THE BASAL METABOLISM IN OBESITY, AND ITS SIGNIFICANCE

In a recent lecture, Du Bois[1] remarked, "It is not too much to say that the science of nutrition is founded on the study of the basal energy requirement." A large number of substitutes for this expression — basal metabolism, basal caloric requirement, basal heat production, minimal metabolism, postabsorptive metabolism, total gaseous exchange, etc. — are in current use; and Du Bois suggests that on looking over this formidable list of synonyms one receives the impression that scientists have spent much time in coining phrases, and have tried to make two words grow where one grew before.

It is a credit to the development of science in America that in recent years so much of the valuable information regarding the fundamental facts of nutrition has been the outcome of research work in our own institutions. This applies, among other things, to the determination of the basal metabolism of man. Du Bois has summarized the results in this way: With most individuals the basal metabolism is surprisingly uniform from day to day and from year to year. Of course the heat production of a man depends largely on his size, but it is by no means proportional to the body weight. A large man gives off more heat than a small man, but for each kilogram of weight the small person has the higher metabolism. On the other hand, the metabolism of men of various sizes and shapes is rather closely proportional to the surface area of the body. Many years ago Rubner established this law of surface area, and was able to show that mice, rabbits, dogs, men and horses had almost the same metabolism per square meter of skin. The level of metabolism varies greatly with age. During the first few days of life it is very low, then rises rapidly during infancy, and reaches its highest level in the almost unexplored period between the ages of 2 and 6 years. After this it falls rapidly until about the eighteenth year, when the curve flattens out. Between the ages of 20 and 40 there is comparatively little change, but after this a slight fall, so that by the eightieth year the line is about 10 per cent. below the average level for the ages of 20 to 40. There seems to be a stimulation to the basal metabolism during the period of growth. Women show an average basal metabolism about 7 per cent. lower than that of men of the same age. Athletes are about 7 per cent. higher than men of sedentary habits. Confinement indoors or in bed reduces the metabolism. Prolonged undernutrition can reduce the metabolism 30 or 40 per cent. Benedict's subject, Levanzin, who fasted for thirty-one days, showed a marked reduction in basal metabolism, amounting to about 23 per cent. after three weeks' starvation.

In abnormal states metabolism may be modified to a surprising extent. Thus in exophthalmic goiter, which involves, as is commonly believed, an overactivity of the thyroid, the resting metabolism may be increased to twice its normal level, whereas in the hypothyroidism seen in myxedema the metabolic heat production is below normal. The fundamental revision of the subject of the physiology and pathology of basal metabolism is certain to furnish data of value in clinical medicine, particularly with respect to food requirement, which is determined by the energy exchanges, and heat regulation incident to the varying heat production of certain diseases.

1. Du Bois, E. F.: The Basal Energy Requirement of Man, Jour. Washington Acad. Sc., 1916, vi, 347.

Obesity is sometimes looked on as a disease. There are, of course, pathologic conditions associated with abnormally large increments in weight and development of the adipose tissue. Is there a form of obesity indicative of a pathologically lessened power of energy exchange—an anomaly of metabolism? Measured on the basis of body weight there may appear to be a distinct difference amounting often to 30 or 40 per cent. in the basal heat production of fat and lean individuals, but they have almost exactly the same heat production in terms of surface area. Means[2] has found that the majority of obese subjects show no alteration in the basal metabolism, as expressed in terms of their surface area, even though the obesity is of a most extreme type.

Occasionally a slight reduction in metabolism occurs in obese persons. In Means' experience such subjects invariably show some clinical evidence of disturbed internal secretion. Hypopituitarism, which is often attended with adiposity, is an illustration of what is referred to here. Perhaps these facts will be of significance in the future in relation to the problems of differential diagnosis in obscure disorders of the endocrine glands.

SUPERSTITIONS CONCERNING MENSTRUATION

It is not surprising to find the mysterious phenomenon of menstruation involved in all sorts of superstitions and religious beliefs. Probably the most widespread assumption which permeated religious rituals and led to the establishment of curious customs associated with the menses was that menstruation periodically rids the body of woman of something undesirable that has accumulated in the organism, more specifically in the blood. To some it thus was a mechanism for removing an excess of nutriment from the body. According to the Mosaic law the mystery represented a process of purification: the impurities collected in the woman's blood were discharged in the menstrual flux, so that she underwent a recurring series of purifications. To the men of the monasteries, says Crawfurd,[3] menstruation was a symbol of the essential sinfulness and inferiority of women, polluted alike and polluting.

It is not difficult to trace a relationship between such ideas and the more magical beliefs that the menstruous woman is possessed by an evil spirit which resides in her blood. Accordingly, by the medium of her menstrual blood she may exert an influence for harm on her environment. The malign spell has at various times and among different races been assumed to exert a variety of potent effects; hence the numerous prohibitions found placed on the female members of the household in the past. Thus is explained the seclusion of women from the cattle and the milk supply at certain periods among the Kafir tribes of South Africa. Frazer says that in Galela women at their monthly periods may not enter a tobacco field, and in Sumatra are forbidden the rice fields for fear of damaging the crop. Whole catalogues of uncanny phenomena attributed to the catamenial state might be enumerated, such as the belief, dating back to the time of Aristotle, that the glance of a menstruous woman takes the polish out of a mirror. Among certain races every house has two doors, one of which is used exclusively by the women during menstruation. Crawfurd naively asks whether "the altogether inordinate apprehensions of both nurse and surgeon as to the evils of operation during the menstrual state are tinctured with the savor of this same superstitious fear."

The idea underlying these customs so interesting in the history of medicine has been summarized by Crawfurd as follows: There resides in the menstrual blood some agent powerful for good or for harm. Most of all is its power over the virility of the male, enfeebling him in the struggle for the survival of the fittest. The spirit of the woman resides in her blood, and is transferable therewith to the male. It is a special aspect and a special application of the universal primitive blood horror, founded on the same belief that the spirit of the person resides in his blood and emerges with it for good or for harm. In addition, there is something unintelligible about menstruation, something uncanny, and the primitive mind explains it as due to some spiritual agency, which may harm the woman if she does not take care of certain precautions, and may pass from her and harm others if they neglect the prescribed precautions.

The periodic changes in the uterine mucous membrane which initiate menstruation are now known to depend on the functional activity of the ovary. The onset of the period coincides with the first production of ripe ova in the ovary; it ceases with the cessation of ovulation at the climacteric or menopause. In cases in which the ovaries have been removed before puberty, menstruation never occurs. Removal of both ovaries from adults usually brings about a premature menopause. Ovulation and menstruation are thus obviously interrelated. Modern theories have usually assumed that menstruation is part of a preparation for the reception of the fertilized ovum. The facts are still too uncertain and conflicting to permit the formulation of a tenable hypothesis. The review of the mystical beliefs of the past always serves as a warning against hasty generalizations in the more enlightened days of modern science.

2. Means, J. H.: The Basal Metabolism in Obesity, Arch. Int. Med., May, 1916, p. 704; Studies of the Basal Metabolism in Obesity and Pituitary Disease, Jour. Med. Research, 1915, xxvii, 121.

3. Raymond Crawfurd, Proc. Roy. Soc. Med., 1915, ix, Section of the History of Medicine, p. 49.

The Growth of Wisdom.—What we call wisdom is the result, not the residuum, of all the wisdom of past ages.—Henry Ward Beecher.

Current Comment

POISONOUS PROPERTIES OF THE GARDEN DAFFODIL

The daffodil (*Narcissus pseudonarcissus*) has graced our gardens for generations. Although its poisonous properties have been known for a long time, little attention has been given to the subject by physicians. In 1910 Walsh[1] noted that the flower pickers of the Scilly Isles were subject to an irritating eruption on the hands, and he attributed this to the handling of the blossoms of the daffodil and narcissus. Neither the juice of the fresh plant, the alkaloid extracted from the plant nor the oil extracted from jonquil pomade produced any effect on the skin unless the skin was abraded. In a recent paper, McNab[2] calls attention to the dangers attendant on the accidental employment of daffodil bulbs as food. An ignorant cook prepared a soup from the bulbs in place of onions, with the result that those who partook of it suffered from nausea and violent vomiting and diarrhea. It was not until after the poisoning had been repeated several times that the error was discovered. There were no deaths. During the discussion, several obscure cases of poisoning were related, which appeared to be explainable by the assumption of similar mistakes. Daffodil bulbs contain an alkaloid (or alkaloids) whose physiologic action differs according to the stage of growth of the plant. If extracted from the flowering bulb the alkaloid produces dryness of the mouth, checks cutaneous secretions, dilates the pupil, quickens the pulse, and slows and weakens the heart contractions. The alkaloid extracted from the bulbs after flowering produces copious salivation, increases cutaneous secretion, contracts the pupil, and produces slight relaxation of the pulse, slight faintness and nausea. Such widely divergent physiologic effects indicate that there must be considerable differences in the nature of the alkaloids at the different times mentioned. Since the daffodil is so common in gardens it might be well to consider it in poisonings of mysterious origin.

1. Walsh, D.: Brit. Med. Jour., 1910, ii, 854.
2. McNab: Pharm. Jour., 1916, xcvi, 367.

THE BACTERICIDAL PROPERTY OF GASTRIC CONTENTS

That gastric contents possess the property of arresting putrefaction was observed in the middle of the eighteenth century by Spallanzani, who found that putrefying meat brought into contact with gastric secretion ceased to putrefy. With the advent of bacteriology this was explained as due to the bactericidal action of the gastric secretion, and the question arose whether under normal conditions pathogenic organisms could pass through the stomach. Koch was the first to show that cholera bacilli were killed by gastric secretion within a few hours. He further held that the organism could pass through into the intestine only in the presence of a disturbance of secretion or as a result of overloading the stomach. Other workers took up the problem, and it was found that cholera germs, typhoid bacilli and pyocyaneus bacilli were killed in a very short time, while anthrax and tetanus bacilli (spore bearers) and the tubercle bacilli passed through unharmed. The mode of bactericidal action of the gastric juice has recently been investigated by Gregersen.[1] Forty-five minutes after an Ewald meal, gastric contents were secured from a variety of conditions, and the power tested on various organisms. He found that the bactericidal power varied directly as the free acid content, and was not influenced by the amount of combined acidity or the amount of pepsin. Furthermore, the bactericidal action of the juice was from three to four times as strong as similar strengths of the pure acid in water. This, he explains, is due to the bactericidal property of the bread used in the Ewald meal, which is activated by the free hydrochloric acid. Solutions of bread in water possessed very slight action, but the addition of pure acid to a percentage approximating that of the gastric contents resulted in increasing the bactericidal power to three or four times that of the two taken separately. That bacteria are constantly passing through the stomach is due to the rapid passage of water and foodstuffs in which the free hydrochloric acid does not reach a sufficient concentration to exercise its bactericidal power.

1. Gregersen: Centralbl. f. Bakteriol., I, O., 1916, lxxvii, 353.

RURAL HEALTH AMERICA'S FIRST DUTY

Shortly after Congress convened, last winter, Senator Randsdell of Louisiana, chairman of the Senate Committee on Public Health and National Quarantine, introduced Senate Bill 2214, appropriating $500,000 for the use of the United States Public Health Service, to be used in investigating and encouraging the adoption of improved methods of rural sanitation and especially for devising and demonstrating effective measures against malaria and typhoid, instructing farmers in the prevention of these diseases, carrying on necessary investigations and surveys, and cooperating with state and local authorities to eradicate these diseases in rural districts. Friday, July 14, in the Senate, Senator Randsdell presented a strong argument for his bill. He reviewed the history of health legislation in the United States, showing that local regulation had generally been ineffective and that most of our advances in federal legislation had resulted from disastrous experiences with epidemic diseases. As the representative of the Southern state in which the inroads of yellow fever have been perhaps most severe, Senator Randsdell is able to speak with authority and from personal observation. New Orleans' recent epidemic of bubonic plague and the brilliant work of the Public Health Service in stamping it out was vividly described. "Never again will there be an epidemic of bubonic plague in New Orleans," he said. "The people of that city realized that the conquest of this disease was one for the federal government. . . . Today, as a result of the campaign against yellow fever and the campaign against bubonic plague, New Orleans is one of the healthiest cities in the world." After

reviewing the work of the Public Health Service and showing the limited means available, Senator Randsdell showed that in this country, in any line of progress, education is indispensable, and that, although much educational work has been done, and although the death rate throughout the nation has fallen during recent years, this decline has been much greater in urban than in rural communities. He then discussed the economic and vital loss due to malaria and typhoid, showing that these two diseases alone cost the United States over $900,000,000 each year, and that both diseases are almost entirely preventable. Comparing the 1915 appropriation for the prevention of human disease with that for the prevention of diseases of animals, Senator Randsdell called attention to the fact that the total amount appropriated last year for human welfare was less than two million dollars, while the amount appropriated for animal and plant welfare was nearly six million. "The problem of rural sanitation," he declared, "is not a local problem, but one which concerns the health and physical integrity of our entire nation." Senator Randsdell's speech in favor of the passage of his bill is one of the strongest public health utterances ever made before Congress. While the bill is simple in its phraseology and provisions, its passage would result in widespread and lasting benefit to the entire country, and would greatly strengthen the Public Health Service. If Congress will pass this measure, it will deserve the gratitude and thanks of the public and especially of our rural population.

THE RESPONSIBILITY FOR PURE WATER SUPPLY

The courts have shown a more and more marked tendency of late to place on companies or corporations supplying water for drinking purposes the responsibility for its freedom from contamination. The farthest advance is made by the Court of Errors and Appeals of New Jersey, which has ruled that a water company supplying water for domestic purposes is liable to a consumer for damages resulting from illness due to pollution of the water, when the water company knew or should have known that the water was contaminated, and that the consumer met the burden of establishing the company's liability by the introduction of testimony which tended to prove open and notorious contamination of streams connected with the company's sources of water supply.[1] It is extremely regrettable that a judge of Pickaway County, Ohio, has shown a reactionary tendency in an instruction to the jury in a similar case.[2] A small epidemic of typhoid fever had been traced to the contamination of the water company's supply owing to a defect in a check valve established between the latter's mains and the extraneous water supply of a paper mill. The administrators of the estate of one of the victims of this epidemic sued the water company for damages. The jury returned a verdict for the defendants. There were several points in the case on which this verdict may have been based. The judge in a remarkable instruction to the jury stated that, if it was a matter of common knowledge that the water was at fault, they should find a verdict for the defendant. He said further that it would be a matter of common knowledge if they found that the subject was discussed in conversation generally and that the newspapers had published recommendations to the consumers to boil the water. It will be seen that this view of the law is diametrically opposed to that which is taken by the New Jersey court in the case already quoted. As neither decision seemed to be based on statute but both on the common law, it is difficult to guess where the judge of the Circleville court can have found his law. It is unfortunate that the nature of the case was such that it was not carried to appeal, and it is to be hoped that should another occasion arise, a decision of the supreme court of the state of Ohio will be obtained.

1. Jones v. Mount Holly Water Company, 93 Atl. Rep. 860 (1915).
2. Grant v. Circleville Water Company, Court of Common Pleas, Pickaway County, Ohio, 1915, Engineering News, 1915, lxxiv, 631.

Medical News

(PHYSICIANS WILL CONFER A FAVOR BY SENDING FOR THIS DEPARTMENT ITEMS OF NEWS OF MORE OR LESS GENERAL INTEREST; SUCH AS RELATE TO SOCIETY ACTIVITIES, NEW HOSPITALS, EDUCATION, PUBLIC HEALTH, ETC.)

DISTRICT OF COLUMBIA

Infantile Paralysis.—To advise the residents of the District of Columbia with reference to anterior poliomyelitis and suggest methods and means for preventing the disease, a proclamation has been issued by the commissioners of the District of Columbia, 50,000 of which have been printed and are being distributed from door to door by the police. This leaflet speaks of the causation of the disease, the methods by which it is believed to be communicated, and gives rules for the protection of children.

Dinner for Dr. Glueck.—Thirty physicians and lawyers, friends of Dr. Bernard Glueck, Washington, tendered him a dinner, July 11, in honor of his recent appointment as alienist at the New York State Prison at Sing Sing. Dr. Glueck will leave his present position at the government hospital for the insane to assume his new duties in about two weeks. Dr. William A. White acted as toastmaster, and brief addresses were made by Drs. George M. Kober, Wilfred M. Barton, Francis R. Hagner and Prentiss Willson, and Messrs. E. J. Ayres, George C. Shinn and Frederick A. Fenning.

ILLINOIS

State Society Picnic.—The first annual picnic of the Illinois State Medical Society was held at State Reservation, Starved Rock, July 12 and 13, and was participated in by about 200. The two days were spent in hikes through the canyons near Starved Rock, in dancing, boating excursions, golf, etc.

Chicago

Disposition of Field Hospitals.—At a meeting of brigade officers at San Antonio, July 10, the disposition of the two field hospitals of the state was considered, and it was recommended that Field Hospital No. 1 be assigned to the First Brigade and Field Hospital No. 2 to the Second Brigade.

Psychopathic Laboratory Attacked.—At a meeting of the board of managers of the Chicago Bar Association recently, the committee appointed for that purpose recommended to the board of managers that the Psychopathic Laboratory connected with the Municipal Court of Chicago be discontinued.

Personal.—Lieut. Ray H. Davies, assigned Illinois Field Hospital No. 2, while entraining for the border at Springfield with his command, fractured two ribs.——Dr. Morris Lewison has succeeded the late Dr. Theodore B. Sachs on the advisory board of the Jewish Consumptive Relief Society.——Dr. John H. Noonan has been appointed assistant surgeon

of the Park Hospital, Livingston, Mont.——Dr. John G. O'Malley has returned after a year of hospital service in the Ypres district of France.

First Conviction Under the Illinois Prevention of Blindness Act.—The secretary of the Illinois Society for the Prevention of Blindness reports that sixteen physicians and midwives have been prosecuted for failure to report cases of babies suffering from ophthalmia neonatorum within six hours after having observed the first symptoms. In one case the physician was convicted and fined $50, but on plea of misfortune made by the defendant's lawyer, and concurred in by the official of the society, the fine was reduced to $25. The attorney general has authorized the prosecution of nine more cases and the data on six additional violations of the law were forwarded to Springfield, July 15.——The Chicago Ophthalmological Society at its annual meeting adopted resolutions endorsing the efforts of the Society for the Prevention of Blindness. The two salient features in the law in question are the requirement that the attending physician or midwife advise the use of a prophylactic in the eyes of all new-born babies, and that report must be made of inflamed eyes irrespective of the cause of infection.

IOWA

Erection of New Hospital.—An isolation hospital having a capacity of forty beds is being erected in connection with the State University of Iowa, College of Medicine. It is reported that $42,000 has been set aside for the construction of the institution.

Personal.—Dr. Walter L. Bierring, Des Moines, was reelected president of the state board of health; Dr. George F. Severs, Centerville, was elected vice president, and Dr. Guilford H. Sumner, Des Moines, was reelected secretary of the board.——Dr. Clinton E. Harris, Grinnell, has been appointed a member of the state board of health.——Mr. A. E. Kepford reentered the state employ, July 15, as tuberculosis lecturer, a position which he resigned a year ago to enter the evangelistic field.——Dr. Frank H. Clark has been elected president of the school board of Clarinda.

MAINE

New State Officers.—At the sixty-fourth annual meeting of the Maine Medical Association, held in Portland, June 7 and 8, under the presidency of Dr. Erastus E. Holt, Portland, the following officers were elected: president, Dr. Willis F. Hart, Camden; vice presidents, Drs. Geoorge R. Campbell, Augusta, and Ralph W. Wakefield, Bar Harbor, and secretary-treasurer, Dr. John B. Thompson, Bangor (reelected). The annual oration was delivered by Dr. Frank S. Meara of New York. After the annual banquet, an illustrated lecture on "Experiences of the Layman on a Journey of Three Months in Japan, Korea and China with Three Prominent Medical Men" was delivered by Dr. Wallace Butterick, secretary of the General Education Board of the Rockefeller Foundation.

MARYLAND

Personal.—Dr. Nathan Winslow of the University of Maryland, who has been ordered to the Mexican border as a member of the Medical Reserve Corps, has been sent to Field Hospital No. 3 on the line of communication under General Pershing.

Medical Officers Meet.—The second quarterly meeting of the deputy state health officers was held recently at the Medical and Chirurgical Faculty Building in Baltimore. Dr. C. Hampson Jones presided and an address was made by Dr. John S. Fulton, secretary of the state board of health. Newly appointed health officers received their commissions. An open discussion of the various phases of the domestic quarantine and contagious diseases was held.

MASSACHUSETTS

Personal.—Dr. Frankwood E. Williams, Cambridge, has been appointed by the governor a member of the advisory prison board.——Dr. Charles S. Curtis, Spencer, who has been on the staff of Dr. Grenfell's Hospital, St. Anthony, Labrador, for more than a year, will return to his home in a short time.

Psychologic Laboratory Established.—As a result of the adoption of a legislative act by the city council, June 23, the Boston police court will have a medical department and psychologic laboratory. Dr. Victor V. Anderson will be in charge of the new bureau, which will pass on the mental condition of offenders.

Health Movies.—More than 5,000 people attended a moving picture show at Franklin Field, Boston, recently, the first of a series to teach hygiene and clean living. Other similar lectures will be given at various parks and playgrounds about Boston during the summer. The state department of health has initiated this work and is working in conjunction with philanthropic societies.

NEW JERSEY

Personal.—Dr. Robert R. Reed, Morristown, is announced as the winner of a photoplay competition for his play entitled "Witchcraft."

Doctors Enroll for Emergency.—Twenty of the prominent physicians of Atlantic City enrolled, July 8, as members of the Atlantic City branch of the American Emergency Corps. The call was issued by Dr. Philip Marvel, Atlantic City.

NEW YORK

Offers Farm for Sick Children.—Madam Edith Helena Rossi has telegraphed Commissioner of Public Health Emerson offering as a fresh air resort her farm of 60 acres at Dykeman, 52 miles from the Grand Central Station, in a virgin forest with a natural lake. Madam Rossi believes that several thousand children can be accommodated in tents if the health department or a charitable society in the metropolis can provide the tents and food for the children.

Training Camp for Doctors.—Maj.-Gen. Leonard Wood, Governors Island, announces that two training camps for medical men will be held in connection with the Plattsburg military training camp this month. The first was opened July 12, and the second will open July 24. The camps will be commanded by medical officers of the regular army. Physicians desiring to attend these camps should communicate with the Military Training Camps Association, 31 Nassau Street, New York.

Poliomyelitis Outside of New York City.—The number of cases of infantile paralysis that have occurred in the state outside of the city of New York since the beginning of the epidemic was 100 up to July 14. There have been in all eight deaths. The state department of health has sent out circulars of information to the health officers of the state as a guide in their campaign for the prevention and cure of the disease. The new instructions would require boarding house and hotel keepers and others to notify the health officers of the arrival of any children from infected districts. The city authorities have offered to take back any cases in other parts of the state that originated in the city. Officers of the state health department have been giving lectures in various parts of the state with a view of instructing health officers and physicians verbally concerning the control of infantile paralysis.

New York City

Provide Aid for Paralysis Cripples.—The Brooklyn Bureau of Charities is making arrangements to handle the aftermath of the epidemic of infantile paralysis and to see that children receive the necessary corrective treatment after being discharged from the hospitals. The committee appointed has decided to extend its activities so as to afford orthopedic care to about 500 children who are soon to be discharged from the Brooklyn hospitals. It is estimated that at the present time more than one half the children who leave the hospitals after an attack of poliomyelitis are crippled.

Personal.—Dr. Elbert M. Somers, Brooklyn, has resigned his position as superintendent of the Brooklyn State Hospital because of ill health.——Dr. C. Grana has sailed for Naples on the *Stampalia*.——Drs. Harry Plotz and George Baehr of the Mount Sinai Hospital have returned after a year spent in work with typhus fever in Serbia, Bulgaria, Austria and Hungary.——Dr. Peter K. Olitsky has returned after several months spent in Mexico in the study of typhus fever and other climatic diseases.——Dr. Franklin C. McLean has started for China, where he has been appointed the executive head at the medical school and hospital to be established in Peking, by the Rockefeller Foundation.

NORTH CAROLINA

State Board Election.—At the annual election of the State Board of Medical Examiners at Raleigh, Dr. Martin L. Stevens, Asheville, was elected president; Dr. Hubert A.

Royster, Raleigh, secretary-treasurer (reelected); Dr. Isaac M. Taylor, Morganton, delegate to the meeting of the council in Chicago, and Dr. Edwin G. Moore, Elm City, alternate.

Must Report Tuberculosis.—The Bureau of Tuberculosis of the state board of health is serving notices on all delinquent physicians and heads of institutions for the treatment of diseases that they are required to report all cases of tuberculosis under their charge to the Bureau of Tuberculosis within seven days after recognition of the disease.

Medical University Extension Lectures.—The medical course offered by the Extension Bureau of the University of North Carolina in connection with the state board of health was started by Dr. Jesse R. Gerstley, Chicago, on "Diseases of Children," July 4. The course is being taken by nineteen physicians and a number of nurses have also been invited to be present.——The first lecture to the Wayne County physicians who have registered for the course of postgraduate medicine was given, June 9, at Goldsboro by Dr. Lewis Webb Hill, Boston. The course consists of seventeen lectures.

Personal.—Dr. John R. Williams, formerly of Greensboro, but of late a resident of Tucson, Ariz., has returned to North Carolina and will practice at Asheville with his father, Dr. John Hey Williams.——Dr. William W. Perdue, formerly associated with Dr. Henry H. Briggs, Asheville, has resumed practice in Mobile, Ala.——Drs. William T. Shipp, formerly of Louisville, Ky., and George W. Shipp, recently of Newton, will be associated in the practice of medicine at Asheville. ——Dr. Benjamin E. Washburn of the International Health Commission, whose headquarters are now at the Port of Spain, Trinidad, is visiting relatives in North Carolina and was in conference, July 5, with Dr. Watson S. Rankin, secretary of the state board of health of Raleigh.——Dr. James A. Speight, Rocky Mount, has been appointed whole time health officer of Nash County, succeeding Dr. James C. Braswell, Jr., Nashville, resigned.

Sanatorium Notes.—The opening exercises of the Anson County Sanatorium, Wadesboro, were held, July 4. In the morning a number of operations were performed and after lunch there was a literary program of four papers followed by a general discussion, and in the evening there was a general reception to the physicians and the public at the hospital.——Appalachian Hall, a sanatorium for the treatment of persons suffering from nervous disorders, has been opened at Asheville under the charge of Dr. Bernard R. Smith.——The deed for a six-room house at Durham to be used for an annex to the Lincoln Hospital for the care of colored tuberculosis patients has been recorded. The price paid for the house was $1,600. The ladies of the Civic League will equip the hospital and the city and county will each appropriate $25 a month toward current expenses.—— Rowan County Medical Society has petitioned the county commissioners to provide a tuberçulosis sanatorium for the county.

PENNSYLVANIA

Personal.—Dr. William S. O'Neill Sherman, Pittsburgh, has started for Europe, where he will do research work in war hospitals for the Rockefeller Institute. He is to make a special study of gangrene, tetanus and amputation.

Ice Cream Causes Typhoid.—Seventeen of the twenty-three cases of typhoid fever in Altoona have been traced to ice cream sold by one dealer, according to the report of Health Officer Thomas G. Herbert. He closed the plant where the confection was made. It was first supposed that the outbreak was due to impure milk, but an investigation showed that every family afflicted had bought ice cream from one dealer and that some had not purchased any milk. The health authorities are continuing their investigation.

Quarantine for Infantile Paralysis.—The advisory board of the Department of Health of Pennsylvania has adopted rules and regulations for the quarantine of infantile paralysis: All premises in which infantile paralysis exists are to be placarded, and no persons other than the attending physician and trained nurse shall enter or leave the said premises; the quarantine period shall be a minimum of twenty-one days from the date of onset until complete recovery or death or removal of patient; placard or placards shall remain in place until the expiration of the quarantine period, and shall be removed only by the health officer at the time when he shall disinfect the premises; after such disinfection, the householders shall thoroughly cleanse the room occupied by the patient and all articles of bedding, clothing, etc., used by the patient, with soap and water and thoroughly air the room and admit as much sunlight as possible; the quarantine restrictions for acute anterior poliomyelitis relating to school attendance, exposure of patient in public places, use of conveyances by persons suffering therefrom, sale of bedding, clothing, etc., burial of bodies and funerals of persons dying therefrom, shall be the same as is now provided for diphtheria and certain other diseases; children under 16 in premises quarantined for anterior poliomyelitis, but not themselves affected with the disease, shall not be permitted to attend any school, church service, theater or moving picture show during the quarantine period, and all doors and windows in rooms occupied by persons suffering from acute anterior poliomyelitis must be screened from flies and other insects.

Philadelphia

Red Cross Campaign.—A large number of physicians and laymen met in the offices of the mayor, July 14, and outlined plans for the enlargement and extension of the South-Eastern Chapter of the American Red Cross. Efforts will be made to obtain 50,000 new members by July 20. Dr. Alfred Stengel presided at this meeting.

To Care for State Troops.—It has been decided to send a band of the South-Eastern Chapter of the American Red Cross to the border in order that the health of the Pennsylvania troops may be more carefully preserved. Materials in large quantities, including reading matter and tobacco, are wanted at once by the Red Cross. A call for 100 women to assist in preparing goods has been issued by Dr. Alfred Stengel, chairman.

Infantile Paralysis.—This city has remained comparatively free from the epidemic of infantile palsy, only two cases having been reported. No new cases have been observed during the present week and only eight cases have been reported throughout this state. At a meeting of the state department of health, rules were adopted placing infantile paralysis on the list of diseases for quarantine. This is the first time in the history of Pennsylvania that this malady has been in this category.

Year's Delay in College Merger.—The merger of the Medical School of the University of Pennsylvania and the Jefferson Medical College, which has been reported in THE JOURNAL, will not be consummated this year. The authorities find that it would be impossible to make proper and adequate preparation for the conducting of the two institutions jointly. The following statement was made by a dean of one of the institutions:

> The members of the United Medical Committee, in charge of the Medical School of the University of Pennsylvania and the Jefferson Medical College, of Philadelphia, have agreed that it is advisable to postpone the consummation of the union agreed on by the plan adopted by the trustees of the two institutions, in order that further opportunity may be afforded for considering a number of important matters relative to the mode of administration of the new school, and have, therefore, determined that each of the schools shall conduct, separately from and independently of the other and of the United Medical Committee, the work of its college term for 1916-1917.

WISCONSIN

Women Charges to be Sterilized.—The State Board of Control, June 29, authorized the sterilization of the women inmates of the State Home for the Feebleminded, Chippewa Falls.

District Turned Over to City.—At the meeting of the Milwaukee Society for the Care of the Sick, July 5, it was voted to turn over its three free dispensaries to the city provided that the municipality will accept and maintain them. The health commissioner presented a resolution to the council for an appropriation of $500 to assume the work of the society.

Hospital News.—At a conference between the executive committee of the Milwaukee Chapter of the American Red Cross and J. J. O'Connor of the Central Division of the Red Cross, it was decided to organize a Red Cross base hospital in Milwaukee; a plan for the aid of dependent families of militiamen and other soldiers was perfected; arrangements were made for the production, warehousing, shipping and distribution of hospital and other supplies; a system of first aid work was established, and arrangements were made for the establishment of an information bureau of soldiers on the border or in Mexico. A fund of $60,000 is to be raised, to be divided as follows: $25,000 for equipment for the base hospital, $15,000 for dependent families of Milwaukee militiamen, $15,000 for supplies and $5,000 for miscellaneous needs.——A brick hospital, two stories and basement in height, and 102 by 42 feet, will be erected at Plymouth this summer at a cost of $24,000 by the Hospital

Association of that city.——The Evangelical Deaconess Hospital, Milwaukee, is to have a four story and basement addition, 42 by 90 feet, to cost about $50,000 and will accommodate about sixty patients.

CANADA

Head of New Hospital at Coburg, Ont.—Dr. Fulton S. Vrooman, for the past three years superintendent of the Brockville (Ont.) Hospital for the Insane, has been appointed superintendent of the new Military Hospital at Coburg, Ont. This hospital has been established by the Canadian government for the treatment of shell shock and nervous cases among returned soldiers.

Infantile Paralysis in Canada.—The Ontario Board of Health reports infantile paralysis as having appeared in Ford, Ont., but so far only one or two cases. The chief officer of health has issued instructions to his aids and to the profession at large to be on the watch for the dread disease. Suggestions have also been made as to its detection, quarantine, etc. It is reported, also, that Montreal has five or six cases of the disease.

Toronto Women Physicians Meet.—The annual meeting of the Toronto Women's Medical Association was held in the Academy of Medicine during the past week. Instructive and interesting addresses were given by Dr. Haslem and Dr. Reta Kilburn, returned missionaries from India and China, respectively. The following officers were elected: president, Dr. Jennie Smillie; vice presidents, Drs. Haslem, Ellen A. A. Burt-Sherratt and Julia Thomas, and secretary-treasurer, Dr. Elizabeth L. Stewart.

Special Convocation at McGill University.—Fourteen medical students have received the degree of Doctor of Medicine at a special convocation held in McGill University, Montreal, last week. Acting-Dean Alexander D. Blackader presented the diplomas. These fourteen men went to the front a year ago with McGill Base Hospital, and after eight months' active service were asked by the British government to return to Canada to complete their studies. The entire number are returning to France with commissions in either the Canadian or British Army Medical Corps.

Toronto Base Hospital.—The old Toronto General Hospital is rapidly being fitted up as a base hospital. The regeneration is being conducted under the supervision of Lieut.-Col. Thomas B. Richardson, who has received the appointment of commandant. With him are to be associated the following: Capts. H. H. Harvie, R. L. Gingall, J. W. Livingstone, R. D. Mackenzie, Angus A. Campbell, Colin G. Campbell, Charles E. Treble, Herbert E. Wallace, Charles C. Ballantyne, Robert F. Slater, James E. Barry, Frederick B. G. Wilson and Alexander E. Macdonald. As soon as possible all the patients from Exhibition Camp, Toronto, will be transferred to the base hospital. The number is now 526.

GENERAL NEWS

Correction.—In THE JOURNAL for July 15, 1916, p. 163, Dr. Oliver S. Ormsby's discussion on the paper by Dr. F. Wise, the word "chrysarobin" should read "neorobin."

Bi-State Meeting.—The first meeting of the Federation of County Medical Societies of Northern Illinois and Southern Wisconsin was held at Freeport, July 6, when the executive officers of seventeen county medical societies convened to organize an independent society. Dr. William B. Peck, Freeport, was elected president and Dr. Nelson C. Phillips, Freeport, secretary.

Resolution on Age of Medical Officers.—House Joint Resolution No. 239, offered in the House by Mr. Lobeck, authorizes the Secretary of War to exempt from the age qualifications in Section 10 of the act approved June 3, 1916, entitled "An act for making further and more effectual provision for the national defense and for other purpose," those persons who had been heretofore designated or invited by the Secretary of War to take examinations for commissions in the medical corps of the army from the operation of said provision of said act.

The Plattsburg Camp.—The first camp of instruction for medical men was opened at Plattsburg, N. Y., July 12, with Maj. William DeWitt, M. C., U. S. Army, in charge. The second camp will open July 24, and while no camps have been established as yet, during the fourth and fifth periods of the camp arrangements for this can be made providing a sufficient number of applicants offer. The number of applicants for each camp is limited to two hundred. Applications should be made to Mr. R. N. McGill, 565 Federal Building, Chicago.

Anterior Poliomyelitis.—Appeal to Congress for $135,000 for support of the public health service's campaign against the infantile paralysis epidemic in New York and to prevent its spread to other states was made by Secretary McAdoo of the treasury department, July 11, and Congress is urged to make the money available immediately. Dr. William C. Rucker, who is in active charge of the fight against the epidemic, believes it will cost about $10,000 a month for the work of the service alone. Secretary McAdoo has offered the assistance of the public health service to the authorities of New York City in their efforts to suppress the disease, and as a result seven public health surgeons are cooperating with the officials there.

Would Inspect Army Food.—An investigation of the food supplied to the army and militia would be authorized under a resolution introduced in the House, July 7, by Representative Hulbert of New York. The resolution would authorize the president to appoint a civilian commission of not less than three members "to inspect the food supplied to the military forces of the United States, and to determine whether it conforms with the specifications of purchase and whether it is wholesome and adequate." The resolution would authorize the commission to serve during the "pleasure of the president," and would provide salaries of $5,000 a year for each commissioner. The resolution was referred to the House Military Affairs Committee.

Bequests and Donations.—The following bequests and donations have recently been announced:

Medical College of the State of South Carolina, Charleston, a donation of $1,000, to be used in purchasing equipment for the outpatient department, by an anonymous benefactor.

Touro Infirmary, New Orleans, a donation of $14,000 for a new building for outpatients by an anonymous benefactor.

Babies Hospital, Philadelphia, a donation of $7,000, the proceeds of lawn fetes given in the neighborhood.

Johns Hopkins Hospital, Baltimore, $500, the income from her gift of $10,000, as a memorial to her little grandson who was drowned one year ago, by Mrs. John Mifflin Hood, the money to be applied for the care of sick children in the hospital.

For a new hospital at Spring Lake, N. J., and a convalescent home, a bequest of land by Mrs. Anne Whartenby and a donation of $42,000 by residents of Spring Lake.

Atlanta Medical College, $25,000 toward an endowment fund, $500 of which was received from Dr. Floyd W. McRae.

Maryland State University, an appropriation of $25,000 a year for two years from the state legislature, for medical education.

Medical College of Virginia, pledges of over $250,000, to be used in the erection of a hospital for contagious diseases, a hospital for colored patients and a nurses' home, these to be departments of the Memorial Hospital.

Ogdensburg (N. Y.) City Hospital, a gift of $130,000 as an endowment by A. Barton Hepburn. The property will be taken over by the A. Barton Hepburn Corporation, which will be incorporated under the laws of the state.

Aid for Belgian Physicians.—The report of the treasurer of the Committee of American Physicians for the Aid of the Belgian Profession lists no contributions for the month of June, 1916.

Previously reported receipts		$7,941.86
Previously reported disbursements:		
1,625 standard boxes of food at $2.20	$3,575.00	
1,274 standard boxes of food at 2.30	2,930.20	
353 standard boxes of food at 2.28	804.84	
Total disbursements		7,310.04
Balance		$ 631.82

F. F. SIMPSON, M.D., Treasurer,
5 Jenkins Arcade Building, Pittsburgh.

Amendment of Alcohol Bill.—An amendment to the existing laws relating to the use of alcohol, free of tax, by scientific institutions or colleges of learning, has been read twice in the Senate and referred to the committee on finance. This act authorizes the secretary of the treasury to grant permits to withdraw alcohol from bond, free of tax, to any scientific university or college of learning constituted as such by any state or territory under its laws, though not incorporated or chartered, and to any hospital maintained by endowment or otherwise and not conducted for profit, on the same terms and subject to the same restrictions and penalties already provided by Section 3297, the Revised Statutes of the United States, and provided that alcohol so obtained may be used in surgical operations and, except as a beverage, in the treatment of patients, and provided further that the bond required may be executed by an officer of an institution for it and on its behalf, with two good and sufficient sureties on like conditions.

The Upson Foundation.—The Henry S. Upson Foundation was organized in 1915 to encourage the systematic study of problems wherein dental pathologic conditions are correlated with those of internal medicine, surgery, neurology and psychiatry. For several years before the death of the late Prof. Henry S. Upson of Western Reserve University he had been initiating researches, collecting data and conferring with

those who might aid his quest. After Dr. Upson's death, Mrs. Upson volunteered to provide means for the further carrying out of Dr. Upson's aim. An organization was formed consisting of Dr. Edward Kirk, chairman; Drs. J. Madison Taylor, Charles E. DeM. Sajous, Nathaniel Gildersleeve, Herman Prinz and Arthur Hopewell Smith, all of Philadelphia. The executive committee of this commission selected a board of associate experts, in lines which include the more cognate subjects, consisting of Drs. DeForest P. Willard, orthopedist; Wendell Reber, ophthalmologist; G. Morris Piersol, internist; Charles R. Turner, prosthetist; Matthew H. Cryer, oral surgeon; John V. Mershon, orthodontist; Seymour DeW. Ludlum, neurologist; Ralph Butler, rhinologist and laryngologist, and Edward A. Schumann, pediatrist, all of Philadelphia. The commission proposes to issue a bulletin from time to time containing scientific communications and the like and the commission also desires to afford every facility in its power to research workers and will be glad to receive communications, suggestions and criticisms, which should be addressed to the Upson Foundation, in care of The Thomas W. Evans Museum and Dental Institute, Spruce and Fortieth Streets, Philadelphia.

Death of Metchnikoff.—The cable reports the death of Prof. Elie (Ilya Ilyich) Metchnikoff, the discoverer of the phagocyte, aged 71. He was born in Sivanopka amid the steppes of southern Russia, where his father, an officer of the Imperial Guard, bred horses for the Russian cavalry. His mother was a Polish Jewess. He became especially interested in natural science at the age of 8, when a medical student with a taste for botany came to tutor an older brother. After obtaining a degree corresponding to our Bachelor of Arts at the University of Kharkoff, Metchnikoff studied in Giessen under Leuckhart, at Göttingen under Henle, and at Munich under Siebold, devoting himself almost from the first to zoology and anatomy. He never took a degree in medicine. His researches on embryology and microzoology were done mostly at the Naples Marine Station. In 1870 he returned to Russia and was professor at Odessa for twelve years but resigned his chair then on account of the political disturbances following the assassination of Alexander the Second by a student at that university. He returned to Italy, settling at Messina and it was there that he discovered phagocytosis from research on the individual cells of sponges and other low forms of animal life. In 1886 he returned to Russia and was appointed director of a bacteriologic station at Odessa, but the influx of patients that had been bitten by dogs and wolves was so great that he had scant time for research and resigned his post. After wandering about Europe for a time he settled in Paris and offered his services to Pasteur, who at once placed a laboratory at the Pasteur Institute at his disposal. Here he had remained ever since, declining offers from Russia and America and devoting himself to his studies and teaching. He was appointed subdirector of the institute some years ago, and the Osiris bequest to the institute of over $2,000,000 has supplied the means for exceptional research on large numbers of monkeys. This has proved particularly useful in studying the chemical prophylaxis of venereal diseases. In 1908 the Nobel prize was divided between Metchnikoff and Ehrlich; the $20,000 which Metchnikoff thus received he devoted entirely to scientific research.

In 1911 he went to Russia to study the plague bacilli in the Astrakhan district. His earlier published works were on cholera, plague and anthrax, the comparative pathology of inflammation, and on immunity in infectious diseases. In 1903 he published his "Etude sur la nature humaine, essai de philosophie optimiste."

With Besredka, in 1912, and later, he insisted on the superiority of sensitized living typhoid bacilli for antityphoid vaccination, their experimental research having shown that even when large numbers of the living bacilli are injected subcutaneously, none are found in the excreta.

Metchnikoff's later studies have been on means to avoid pathologic old age. It was his view that an anthropoid mother eons ago gave birth to freak children. They had abnormally large brains, lodged in an abnormally large skull, permitting intellectual development, and thus were the first human beings. But they were freaks; the man's body was not ready for the man's brain. Man, he declared, is the victim of a lot of troublesome rudimentary organs that the monkeys had not had time to get rid of and others that man has not had time to develop. Chief among these "disharmonies" is the large intestine, which is necessary only to the digestion of grass and grain eaters. Its only use seems to be to breed poisonous toxins, mostly the production of the colon bacillus. By overcoming the production of indols and phenols by the colon bacillus, much of these toxins can be avoided, and he was convinced that acid-producing bacteria accomplished this task of subjugating the colon bacilli.

FOREIGN NEWS

Sodré, a Physician, Appointed Prefect of Rio.—Our Rio exchange, the *Brazil Medico*, relates that its founder and editor in chief, Prof. Azevedo Sodré, has been appointed prefeito of the federal district, a position equivalent to governor of the city and district of Rio de Janeiro. He has long held the chair of clinical medicine in the University of Rio, and served as president of the Brazilian Association of the Medical Press, and for the last year as chief of the department of public instruction.

WAR NOTES

Base Hospital Unit Established.—A base hospital unit is being organized at the German Hospital, New York, under the direction of Dr. Frederic Kammerer, who has just returned from active service with the German army.

Surgical Units Reach Berlin.—The two American surgical units, headed respectively by Drs. John R. McDill, Milwaukee, and Dr. Paul F. Martin, Indianapolis, have arrived in Berlin and left, June 24, to join the war hospitals to which they have been assigned. Dr. McDill is to be stationed in Cologne and Dr. Martin in Budapest. Each unit consists of four surgeons and four nurses.

Great Britain Will Not Permit Red Cross Shipments to Central Powers.—It is reported from Washington that Great Britain has again refused a plea of the American Red Cross for permission to make additional shipments of Red Cross supplies to Germany and Austria and that Great Britain cannot entertain the suggestion that supplies be sent under guarantee or that their distribution will be supervised by a satisfactory commission of Americans.

OUR TROOPS ON THE BORDER

Comforts in Border Hospitals Needed.—In reports from El Paso it is stated that of the twelve pavilions of the base hospital at Fort Bliss, only two have electric fan equipment and the temperature ranges more than 100. Twenty additional pavilions in connection with the hospital have already been built, and a laboratory is to be provided. Each pavilion will accommodate thirty-eight patients.

New Base Hospital.—A letter has been received at the American Red Cross headquarters from Dr. William J. Mayo, Rochester, Minn., stating his willingness to organize a base hospital, the personnel and equipment of which is to be furnished by the Mayo Clinic. The number of medical officers in such a hospital is twenty-three, the number of beds 500, and the cost of the equipment is $25,000.

Red Cross Supplies for Texas.—Supplementary instructions for the collecting of military relief supplies for the American troops on the Mexican border just issued by the American Red Cross name six intermediate depots in railroad centers of the United States where supplies should be sent to be assorted and classified, and three distributing depots from which final distribution of supplies be made to troops at the front. The points selected and districts embraced are as follows:

New York District, Red Cross Supply Depot, Bush Terminal No. 19, 39th Street and Second Avenue, South Brooklyn, N. Y.; includes all New England and the eastern part of New York State.

Cincinnati District, headquarters in Cincinnati; includes Pennsylvania, the western part of New York, New Jersey, Delaware, Maryland, West Virginia, Ohio and Indiana.

Chicago District, headquarters Red Cross Supply Depot, Clearing Argo District, Chicago; includes Minnesota, Wisconsin, Michigan and Northern Illinois.

Kansas City District, Red Cross Supply Depot, care Montgomery, Ward & Co., Kansas City, Mo.; includes North and South Dakota, Nebraska, Iowa, Northern Missouri and Northeastern Kansas.

Denver District, headquarters in Denver; includes Montana, Idaho, Wyoming, Utah and Northern Colorado.

San Francisco District, headquarters Red Cross Supply Depot, care Mr. A. B. C. Dohrmann, San Francisco; includes Washington, Oregon, Nevada and Northern California.

The headquarters of the following additional three districts are designated "distributing depots":

Douglas, Ariz., headquarters Red Cross Supply Depot, care Mayor W. H. Adamson; for all of Arizona and the southern part of California (Los Angeles).

El Paso, Tex., Red Cross Supply Depot, 516 San Francisco Street, El Paso, for all supplies from intermediate depots at Kansas City, Denver, San Francisco and from all territory west of Kansas not otherwise embraced.

San Antonio, Tex., District, headquarters Red Cross Supply Depot, Avenue E and Fourth Street, San Antonio; for all supplies from intermediate depots at New York, Cincinnati, Chicago, and from all southern states situated to the east of a north and south line through the western boundary of Kansas.

Each depot is under the charge of a manager who has general supervision over the receipt, storage and shipment of supplies and of their final disposition.

LONDON LETTER

LONDON, June 26, 1916.

The Causes of the Falling Birth Rate

A report of the commission of inquiry into the falling birth rate has aroused a good deal of commentary in the press. Dr. Mary Scharlieb writes that the increase of excessive stature among women does not affect the birth rate at all; but the question of girls' sports is a subject for special attention from the medical profession, parents and heads of schools. The statement that violent exercise prevents women later in life from nursing their children is not true. It is largely a question of habit and imitation. The limitation of families is due to many causes and not always to selfish ones. The question is whether the government ought not to attempt some plan of scholarships or insurance, say 2 cents a week paid from birth by the parents, the government to pay an equal sum, the total to be used when the child needs it for education, apprenticeship, or a good start in life.

The important bearing of the question of housing on the birth rate and on the prevention of infant mortality is emphasized by Miss Halford, secretary of the Association of Infant Welfare and Maternity Centers, who says that landlords refuse to accept as tenants people with large families. Other tenants object to the noise. Large families, for whom basements are often the only housing accommodation available, suffer in health. At an infant welfare center the difference in children born and bred in basements was pointed out. Professional women have in many cases come to regard themselves as a class destined to celibacy. The opinion is expressed that the ban on the marriage of women officials (temporarily relaxed from necessity during the war), which is imposed by government departments, ought to be removed. This attitude has its effect on other than government employers, and means the enforced retirement on marriage of women who have been earning good incomes.

The Demand for Army Surgeons

The army has now taken 11,000 physicians from private practice and is asking for another 4,000. This, with the 1,500 medical officers in the permanent service, gives a total of 16,500. In a letter addressed to the civilian medical profession, Sir Alfred Keogh, director general of the army medical service, points out that the profession has now been entrusted in a very special manner with the responsibility of working out in cooperation with the government the mobilization of the whole of the medical services of this country for its civil needs on such lines as shall enable the pressing requirements of the army to be met with the least possible injury to the civil population. He is convinced by close and continuous observation of the problem that it is only by means of such a national organization of medical services, effected by the profession itself, that the profession can be assured of serving the country with the maximum of efficiency and with the minimum of disturbance and friction in the case of individual physicians. The scheme adopted by the army authorities does not touch the question of how physicians over military age who do not come forward are to be dealt with, and this is its weak point. Sir Alfred Keogh has no authority to dispose of these men. But unless these men can be moved to areas where their services are required, the fullest efficiency cannot be attained. For example, three physicians over military age may choose to remain in one area while another area has no physician. This difficulty can be solved only by the application of compulsion to the whole medical profession. There is no very cogent reason why compulsion should not be applied, and there are many reasons why it should be. The necessity of carrying on and winning the war overrules all personal considerations. Medical men, old as well as young, must go where they are required. As the success of Sir Alfred Keogh's scheme depends, to a great extent, on the possibility of moving older physicians to the places where they are required, it is suggested that a committee of representative physicians should be formed and a scheme of general mobilization drafted by them. Parliament, which has dealt with munition workers, should not hesitate to deal also with men on whose labors the future health of the people, and especially of the children, so largely depends.

A State Medical Service

The insurance act marked a great advance in the government control of medical service. But the physicians employed are simply under a contract to attend the wage earners in the country, and otherwise are free to do as they will. It is now generally admitted both by the friends and the foes of the act that much modification is necessary, and this will certainly take the direction of further state control which will probably terminate in time in a state medical service in which the physicians will be officials in exactly the same position as other government officials, or like the permanent army surgeons. A complete system of specialists, physicians, health officers, nurses and hospitals will probably be evolved. While it may be admitted that both the public and the profession will lose something by the reduction of the independent physician to an official it cannot be gainsaid that the scheme does not offer great advantages. Dr. J. P. Walker, health officer of the Isle of Wight, makes the following trenchant comments on the drawbacks of the present system, which he regards as on a wrong basis altogether. Every physician is now in competition with his fellows for his daily bread, and this competition is good neither for the physician nor his patients. Medical success is not necessarily dependent on a physician's skill and knowledge; it depends on much besides, for example, the size of his house, the luxuriance of his motor car, the charm and ability of the physician's wife; all these influence his worldly success. But should he venture to criticize those who employ him! How fares he, for example, should he tell his best paying patient there is nothing really the matter with her, that she needs work, and that employment would rob her of all her fancied ailments? Should he tell his chief magnate that the death rate from consumption is due to his germ-breeding cottages, how would he fare? Dr. Walker goes on to show how impossible it is for physicians to keep up their knowledge by attending hospital, except in a few cases, and how the public suffers thereby. It also points to the bad distribution of physicians, giving in 1910 one physician to 356 persons in Hampstead and one to every 5,582 in Shoreditch.

Vital Statistics

The report of the registrar-general, Dr. Stevenson, on the vital statistics for 1914, has just been issued. The population of England and Wales in the middle of that year is estimated at 36,960,684, made up of 17,877,052 males and 19,083,632 females. The marriages during the year numbered 294,401, giving a rate of 15.9 persons married per thousand population, or 0.2 above the rate for 1913, and 0.4 above the average rate in the decade 1901-1910. It was the highest rate recorded since 1907. The provisional figures for 1915 indicate a further rise of 3.5 per thousand. The birth rate in 1914 was 23.8 per thousand, being 2.1 below the average for the preceding decennium. It was the lowest on record, the next lowest being 23.9 in 1912, and the highest 36.3 in 1876, since which date the rate, with a few insignificant exceptions, has fallen year by year. The total number of births registered was 879,096; 447,184 were males and 431,912 were females. Tables are given showing that while the proportion of women of childbearing age to the total population rose from 23.1 per cent. in 1871 to 24.9 per cent. in 1911, the proportion of these women who are married fell from 49.6 to 47.7 per cent., and the average age of married women of childbearing age has steadily increased. While these changes would tend to influence the birth rate, the first making for its increase and the other two for its decrease, the conclusion is that "the net fall in the birth rate of the present day must be due to a diminution in the fertility of these women from whatever cause including that resulting from increase in their average age." From tables showing the birth rates of different parts of the country, it appears that the rates are highest in Wales, next highest in Lancashire, Cheshire, Yorkshire and the counties north of them, and much the lowest in the South. These differences are attributed to real differences in fertility. Compared with 1913, there was an increase in the rural districts of the North and in the smaller towns in Wales, and a decrease in all other areas except the county boroughs of the North. While the birth rate was lower than in 1913, the death rate was higher, the rate of natural increase for 1914 being only 0.1 above that of 1911, which was the lowest yet recorded.

The total number of deaths registered in the year was 516,742. This gives a rate of 14 per thousand population, 0.2 higher than in the preceding year, but 1.4 below the average for the ten preceding years. Of the total number of deaths registered, 91,971, or 17.8 per cent., were those of infants under 1 year of age. This corresponds to an infant mortality rate of 105 per thousand births, being 14 per thousand below the average for the preceding ten years, and the lowest on record, excepting an equal rate in 1910 and a lower one in 1912. The provisional infant mortality rate for 1915 shows an increase to 110 per thousand births—no doubt because of the disturbing influence of the war.

PARIS LETTER

PARIS, June 22, 1916.

The War

HEAD WOUNDS CAUSED BY PROJECTILES

At a meeting of the Société de Chirurgie de Paris, Dr. Hartmann, professor of clinical surgery at the Faculté de médecine de Paris, presented a report of 154 cases of craniocerebral wounds caused by projectiles, which report was submitted to the society by Drs. Okinczyc, Halphen, Prat, Monod, Métivet. In regard to the distribution of these wounds, the most frequent are those of the parietotemporal (from 60 to 65 per cent.), the next those of the frontal (20 to 30 per cent.), and then those of the occipital region (6 to 18 per cent.). Generally (130 cases out of 150) there was an obvious complete fracture of the skull, and in eighty-five of these the dura mater was injured. The brain generally presented injuries which were more extensive than the lesion of the dura mater would lead one to expect. With regard to the symptomatology of these wounds, the reporters insist on the fact that the patients suffering from cranial lesions sometimes present no functional trouble of any kind. They are able to walk and to speak and to move in a normal manner without any difficulty; indeed, they sometimes do not even have the slightest headache. As a result of these facts, soldiers suffering from serious head injuries are sometimes sent to ambulance stations for minor wounds. In other cases definite symptoms exist, some of them general, such as headache, stupor, coma or delirium, and other localizing symptoms, such as jacksonian epilepsy and visual disturbances. The prognosis in these lesions is grave, and varies not only according to their intensity but according to the region affected. The most serious are the lesions of the temporal region; next come those of the parietal region, then those of the frontal region, and finally those of the occiput. In reality, the death rate is often higher than that indicated by the statistics of most surgeons, in the first place because those who operate at the front do not learn of the deaths from secondary complications of those patients whom they have been obliged to send to the rear, while, on the other hand, the surgeons in the rear do not see those smashes of the skull which, being followed almost immediately by death, have not allowed of transportation. The most common cause of death is meningitis. This occasionally makes its appearance at some distance from the original wound, a fact which is explicable either by the depth and length of the track ploughed by the projectile in the cerebral substance, or by the production of infection along the cracks in the bone.

With regard to treatment, Prat, Métivet, Okinczyc and Monod are in agreement that it is indispensable to practice an immediate exploration, exposing the bone in all firearm wounds of the skull. Métivet prefers a crucial incision, the others a flap. Prat insists on the necessity of opening the skull even when the bone lesion is small. He does not, however, consider it necessary to follow up all the cracks which radiate from the point of penetration. As a guide for the diameter of the trephining, he takes the extent of the lesion in the dura mater and he enlarges the opening until he finds himself in the presence of a normal dura. The dura mater, if it does not pulsate, must be freed and the cerebral substance exposed, all fragments removed and wick drainage installed.

In the last session but one of the Réunion médico-chirurgicale de la XVI-e région at Montpellier, two resolutions in the following sense were voted: First, on account of the very reserved prognosis which should always rule in cases of serious craniocerebral injury, it is not considered prudent to return to active service those who have suffered from such lesions. If they do not present any serious disturbances they may be kept in the rear formations under medical observation, or they may be sent to auxiliary services, care being taken that they shall be selected for work which does not expose them to violent effort or to sudden changes of temperature or atmospheric pressure. On the other hand, if there are still evident unfavorable symptoms, they should be discharged from the service.

The second resolution dealt with the question of communicating to the special services in the interior of the country details concerning the injuries, operations undergone and the general condition of wounded soldiers. In order that this may not be entrusted to the wounded man himself, or to some intermediary who may be negligent, it is recommended that these communications should be made on a small register of wounds and injuries similar to the individual military pass. These resolutions, after having been voted by the Réunion médico-chirurgicale de la XVI-e région, have also been submitted to the recent common session of the Société de chirurgie de Paris and the Société de neurologie de Paris (Paris Letter, June 1, 1916).

THE RIGHT OF THE WOUNDED TO REFUSE TREATMENT

Continuing the discussion opened last week at the Académie de médecine (THE JOURNAL, July 15, 1916, p. 217), on the right of a soldier to refuse treatment, Professor Grasset of Montpellier laid stress on the urgent necessity of obtaining an official or even legislative interpretation of the instructions of April 5, 1915 (THE JOURNAL, Aug. 21, 1915, p. 729). These instructions dealt with treatment intended only for immunization or cure; they did not cover interventions for diagnostic purposes. They defined the simple and noncutting methods of treatment, such as massage, mechanotherapy, thermotherapy and electrotherapy, which the wounded may not refuse. As the result of this drafting, numbers of the wounded refuse slight operations for diagnostic purposes, such as lumbar puncture and the taking of blood for Wassermann reactions. In the centers where a considerable number of psychoneurotic cases are concentrated these refusals have been particularly numerous. The recalcitrants are not always malingerers, but sometimes they are persons who have a real fear of pain or others who, having received a wound which keeps them away from the front, have no desire to see their cure hastened or to diminish the amount of indemnity which they receive. In these circumstances the urgency of the need for setting the matter at rest is evident. If this question is not settled very soon the time will come when men will refuse not merely a lumbar puncture but a simple bleeding, a wet cupping or a hypodermic injection.

MEDICAL EXAMINATION OF PHYSICIANS UNFIT FOR SERVICE

M. Justin Godart, undersecretary of state for the military health service, has just ordered a reexamination of the physicians who have been rejected as unfit. In a circular on this subject, addressed to the regional directors, the secretary of state says: "There exists in every region a certain number of physicians rejected as unfit for service whose unfitness is hardly confirmed by their appearance or by the activity which they daily display. In a certain number of cases this state of affairs has unfavorably affected public opinion and has caused these physicians a certain amount of moral prejudice. I have, therefore, decided to submit them to reexamination. This examination must be particularly careful and it must be carried out under your direction and in your presence by two surgeons of the army already chosen by the recruiting commissions. You may also consult specialists should you think it necessary."

INAUGURATION OF A SCHOOL FOR THE REEDUCATION OF CRIPPLES

The union of foreign colonies in France in favor of victims of the war, in which are grouped eighteen foreign colonies under the presidency of M. Shoninger, honorary president of the American Chamber of Commerce, has founded at the Grand-Palais in Paris a school for the vocational reeducation of the wounded and cripples of our army. This school, which has just been inaugurated by M. Justin Godart, undersecretary of state for the military health service, contains workshops for machinery, electrical fittings, joinery, cabinet making, locksmith's work, shoemaking, saddlery, harness making and tailoring. The men working in these different shops are paid at the rate of 15 centimes (3 cents) per hour and as soon as their work becomes productive they receive the price of it. To this school is attached a section where the pupils study French, stenography, typewriting, accounting, industrial and architectural drawing and English.

Marriages

Charles Edward Peters, M.D., National Soldiers' Home, Danville, Ill., to Miss Frances Pitt Stack of National Military Home, Marion, Ind., July 3.

George Louis Alexis Hamilton, M.D., Kansas City, Mo., to Miss Louise Alice Moening of Washington, D. C., at Marceline, Mo., July 6.

William Breese McWhorter, M.D., Acting Assistant Surgeon, U. S. P. H. S., Rome, Ga., to Miss Annie Berry, at Athens, Ga., June 17.

Chester Arthur Skelton, M.D., St. Elmo, Chattanooga, Tenn., to Miss Gertrude Schultz of Cleveland, Tenn., July 2.

John Allen Gentry, M.D., Atlanta, Ga., to Miss Marguerite Love Sasser, Sasser, Ga., in Atlanta, June 25.

James Howard Anderson, M.D., Marytown, W. Va., to Miss Marguerite Emery of Kenton, Ia., June 28.

John Elias Freed, M.D., Terre Haute, Ind., to Miss Mary McManus of Brazil, Ind., in Paris, Ill., June 21.

Alexander David McCrackin, M.D., Kellogg, Ida., to Miss Florence McFarland of Bovill, Ida., June 29.

George Minor Mackenzie, M.D., to Miss Eleanor Whiteside Hobson, both of New York City, June 22.

Martin Hayward Post, Jr., M.D., St. Louis, to Miss Dorothy Lee Rice, New York, July 22.

Charles Augustus Young, M.D., to Miss Jettie L. Coffman, both of Rio, W. Va., July 3.

Lawrence Hempson Mayers, M.D., to Miss Antoinette Redfield Hale, in Chicago, July 1.

Fred Erland Deal, M.D., Weir, Kan., to Miss Winnie George of Slater, Mo., June 30.

Hartwell Weaver, M.D., to Miss Imogene Slayden, both of Dickson, Tenn., June 17.

Charles A. Cattermole, M.D., to Miss Alberta Long, both of Pueblo, Colo., July 1.

Deaths

Alfred Cleveland Cotton, M.D., Chicago; Rush Medical College, 1878; aged 69; a Fellow of the American Medical Association; a veteran of the Civil War, in which he served as drummer in Company F, One Hundred and Thirty-Seventh Illinois Volunteer Infantry; died at his home, July 12, from heart disease. Dr. Cotton had been engaged in practice in Chicago since 1878, specializing in pediatrics during later years. He was professor of pediatrics in Rush Medical College; attending physician to the children's department of Presbyterian Hospital and consulting physician to the Central Free Dispensary and Jackson Park Sanitarium. For many years Dr. Cotton was physician in charge of the infectious disease ward of Cook County Hospital and he was once City Physician of Chicago in charge of the isolation hospitals and the bridewell. He had been president of the Illinois State Medical Society, Chicago Medical Society, American Pediatric Society, Chicago Pediatric Society and Chicago Medical Examiners' Association and medical referee of the Prudential Insurance Company of America. He was the author of textbooks on "Diseases of Children," "Anatomy, Physiology and Hygiene of the Developing Period," and "Care of the Infant," in addition to many monographs on pediatric and allied subjects.

Surg. Charles Poindexter Wertenbaker, U. S. P. H. S.; aged 56; one of the oldest and most esteemed officers of the corps; died at his home in Charlottesville, Va., July 12. Dr. Wertenbaker was a native of Charlottesville, and was a graduate of the Medical Department of the University of Virginia, Charlottesville, in 1882. After postgraduate study in the medical schools and hospitals of New York he entered the Marine Hospital Service as assistant surgeon, Aug. 18, 1888, was promoted to passed assistant surgeon, Sept. 4, 1892, and was made surgeon, Feb. 16, 1904. He was a member of the National Guard of Virginia for thirteen years before entering the United States service. Dr. Wertenbaker was a Fellow of the American Medical Association, a member of the Association of Military Surgeons of the United States, and its president in 1911. He was well known as an expert on communicable diseases, and of late years had been especially interested in the tuberculosis problem among the negroes of the South. Dr. Wertenbaker was also sanitary director of the Jamestown Exposition. In his death the Public Health Service loses one of its most efficient officers and the medical profession a physician of high attainment.

John F. W. Whitbeck, M.D., Rochester, N. Y.; University of Pennsylvania, Philadelphia, 1870; aged 72; a Fellow of the American Medical Association; president of the Medical Society of the State of New York in 1912, and Rochester Academy of Medicine, and a fellow of the American College of Surgeons; formerly surgeon general of the state and commissioner of the Rochester Board of Health; one of the most prominent surgeons of western New York; for many years president of the staff of the Rochester General Hospital and president of the board of managers of the Iola Sanitarium; died at his home, July 3, from acute dilatation of the heart. The Rochester Academy of Medicine and Monroe County Medical Society, at special meetings, adopted resolutions eulogistic of Dr. Whitbeck and expressive of affection and regret.

Charles Hamilton Hughes, M.D., St. Louis; Washington University, St. Louis, 1859; aged 77; a Fellow of the American Medical Association; a well-known neurologist and medicolegal expert of St. Louis; major of cavalry and surgeon in charge of hospitals during the Civil War; formerly superintendent of the Fulton, Mo., State Hospital for the Insane, and lecturer on medicine; professor of nervous and mental diseases and president of medical college faculties in St. Louis; one of the founders of the Marion-Sims Medical College; a member of the American Academy of Medicine, Association of Military Surgeons of the United States, and once president of the Mississippi Valley Medical Association; died at his home, July 13.

John Patrick Corrigan, M.D., Pawtucket, R. I.; New York University, New York City, 1883; aged 59; formerly a Fellow of the American Medical Association; a member of the Rhode Island Ophthalmological and Otological Society and formerly president of the Pawtucket Medical Association; surgeon to the eye and ear department of the Memorial Hospital, Pawtucket; who had been studying four years for the priesthood and was about to enter the Dominican Order; died in Providence Hospital, Washington, D. C., July 6, from heart disease.

Joseph Addington Gale, M.D., Roanoke, Va.; Bellevue Hospital Medical College, 1866; aged 73; a Fellow of the American Medical Association; a member of the Southern Surgical and Gynecological Association; president of the Medical Society of Virginia in 1903-1904 and a Fellow of the American College of Surgeons; chief surgeon of the Norfolk and Western Railroad for twenty-five years; hospital steward in the Confederate Army during the Civil War; died at his home, July 5.

Francis Sorrel, M.D., Washington, D. C.; University of Pennsylvania, Philadelphia, 1848; aged 89; assistant surgeon, U. S. Army, from 1849 to 1856; a member of the legislature of California in 1860 and 1861; a Confederate medical officer during the Civil War and medical director of the General Hospital, Richmond, Va.; died in his apartments, in Washington, June 30.

Joseph William Henry, M.D., San Francisco; University of Southern California, Los Angeles, 1897; aged 45; a Fellow of the American Medical Association; a member of the staff of St. Mary's Hospital, San Francisco; who was taken ill while making an automobile trip; died at O'Connor's Sanitarium, San Jose, June 28.

Joseph Camp Phillips, M.D., Port Arthur, Tex.; Tulane University, New Orleans, 1908; aged 40; a Fellow of the American Medical Association; a specialist on diseases of the eye, ear, nose and throat; formerly professor of chemistry in Mississippi Medical College, Meridian; died at his home, July 3, from meningitis.

Henry Horlbeck, M.D., Columbia, S. C.; Medical College of the State of South Carolina, Charleston, 1897; aged 43; a Fellow of the American Medical Association and a specialist on diseases of the eye, ear, nose and throat; died in Summerville, S. C., May 6, from laryngeal and pulmonary tuberculosis.

Thomas Irwin, M.D., Moberly, Mo.; Washington University, St. Louis, 1873; aged 68; formerly a Fellow of the American Medical Association; consulting surgeon to the Wabash System and local surgeon to the Missouri, Kansas and Texas Railway; died at his home, July 5.

Edward N. Flynn, M.D., Jeffersonville, Ind.; Hospital College of Medicine, Louisville, 1897; aged 48; a member of the Indiana State Medical Association; mayor of Jeffersonville from 1905 to 1909; died at the home of his sister in that city, July 9.

Thomas Henderson, M.D., Detroit; Detroit College of Medicine and Surgery, 1886; aged 61; a member of the Michigan State Medical Society; president of the board of education of Detroit in 1898-1899; died at his home, July 4, from uremia.

E. W. Dean, M.D., Hiram, Ga.; Medical College of Georgia, Augusta, 1883; a member of the Medical Association of Georgia; a well-known banker and physician; died in a sanatorium in Atlanta, July 4, after a surgical operation.

William H. Winkler, M.D., Applecreek, Ohio; University of Wooster, Cleveland, Ohio, 1872; aged 72; a practitioner and druggist of Applecreek for thirty-one years; died at his home, July 6, from cerebral hemorrhage.

Erwin Eugene Britton, M.D., McClure, Ohio; Cincinnati College of Medicine and Surgery, 1879; aged 66; for six consecutive terms mayor of McClure; died at his home, about June 28, from cerebral hemorrhage.

John Philip Van Voorhis, M.D.; Fairdale, Ill.; Eclectic Medical Institute, Cincinnati, 1856; aged 82; for more than fifty years a practitioner of Fairdale; died at his home, July 4, from senile debility.

William Washington Denny, Pink Hill, N. C. (license, thirty years' practice, 1890); aged 83; an honorary member of the Medical Society of North Carolina; died at his home, July 2, from senile debility.

James Theodore Roan, M.D., Waycross, Ga.; Southern Medical College, Atlanta, 1882; aged 63; formerly sanitary officer and county physician for Brooks County, Ga.; died in Townsend, Ga., June 30.

James Henry Waite, M.D., Eagle Bridge, N. Y.; University of Michigan, Ann Arbor, 1890; died in the Samaritan Hospital, Troy, N. Y., from inoperable carcinoma of the stomach, June 9.

Andrew Jacob Koontz, M.D., Independence, Va.; College of Physicians and Surgeons, Baltimore, 1887; aged 57; a practitioner and druggist; died at his home, June 20, from heart disease.

Pearson William Yard, M.D., Trenton, N. J.; New York University, New York, 1889; aged 52; died at his home, June 28, after an illness of six months, from septicemia due to the scratch of a pin.

Charles L. Stiles, M.D., Owego, N. Y.; Geneva (N. Y.) Medical College, 1865; aged 81; a member of the Medical Society of New York; died at his home, April 21, from cerebral hemorrhage.

Lyan W. Hendershott, M.D., Mill Shoals, Ill.; College of Physicians and Surgeons, Keokuk, Iowa, 1881; aged 66; for more than forty years a practitioner of Illinois; died at his home recently.

I. R. Aultman, M.D., Meigs, Ga.; Medical College of Georgia, Augusta, 1893; aged 56; a practitioner and druggist of Meigs since 1891; died at his home, June 23.

Robert M. Marshall, M.D., Shenandoah Junction, W. Va.; University of Maryland, 1866; aged 72; for half a century a practitioner of West Virginia; died, June 22.

Thomas Gillespie, M.D., Kenosha, Wis.; Hahnemann Medical College, 1880; aged 81; a clergyman, teacher and physician; died at his home, July 4.

George Salisbury Clarke, M.D., Amherst, Mass.; Toledo (Ohio) Medical College, 1892; aged 62; died at his home, June 22, from nephritis.

Anna D. Varner, M.D., Wilkinsburg, Pa.; Cleveland (Ohio) Homeopathic Medical College, 1896; died at her home, June 26.

Samuel J. Carpenter, Wichita, Kan. (license, Kansas, 1901); aged 93; a practitioner for seventy-one years; died at his home, June 29.

Andrew Nicholas Sprafka, M.D., Chicago; Northwestern University Medical School, 1914; aged 26; died in Chicago, June 22, from appendicitis.

John C. Tatman, M.D., Oak Creek, Colo.; Rush Medical College, 1867; aged 73; died at his home recently.

James Lynd Savage, M.D., Fargo, N. D.; Milwaukee Medical College, 1897; aged 43; formerly coroner of Cass County; died at his home, July 2, from heart disease.

The Propaganda for Reform

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

WINE OF CARDUI SUIT

(*Continued from page 231*)

May 23, 1916, Morning

TESTIMONY OF DR. ARTHUR HILL GRIMMER

The Court met pursuant to adjournment. Dr. Arthur Hill Grimmer was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. WALKER

Dr. Grimmer testified that he is a physician practicing in Chicago. He graduated from the Hahnemann Medical College of Chicago, and is now adjunct professor of materia medica. In addition to his work for the college, he practices medicine. He teaches the homeopathic system of medicine and gives medicines by mouth.

Q.—How do you obtain the medicines that are used in your school of medicine? *A.*—As all—first, all of the drugs are proven on a healthy subject, on healthy subjects. That is, before any drug is given to the sick there is a proving on the healthy.

Q.—What do you mean by provings? *A.*—Healthy subjects are taken and examined by competent men to find out whether they are healthy or not, and when they are found to be normal they are given these drugs until they produce symptoms, either subjective or objective symptoms and those symptoms are recorded and kept track of and a great number of individuals showing those symptoms constitute what is known as a proving.

To those symptoms are added all those cases of poisons or symptoms that arise from poisoning cases of various drugs.

Then another class, a smaller class of symptoms are added, which are known as "cured symptoms." Symptoms that have never been brought out in a proving to have been—but have been cured repeatedly by the drug.

All those symptoms taken together constitute what is known as a finished proving of the drug.

Q.—Suppose a prover—is that what you call the healthy person who is taking the drug? *A.*—The prover, yes, sir.

Q.—Suppose a prover is taking it for the purpose of finding out whether a drug has any efficiency or potency how do you keep track of the man himself and under what conditions are the provings made so as to get the objective symptoms that you speak of, for instance? *A.*—I do not know as I quite understand your question.

Q.—Well, suppose I was a healthy subject and you were proving a drug on me. How is the progress of the drug watched or controlled in the individual? That is what I mean by it. *A.*—Well, the master prover, the one who is in charge of the provings, of course interrogates the prover every day in regard to his symptoms, and observes—at the present time, bringing the methods up to the present date—they make analyses of the urine and of the blood, the blood pressure and those things are observed now. In former times until those things became more in vogue, they were not used. The original provings only constituted subjective symptoms, and they were kept track of by the master prover. Any sensations or change from the normal in any way.

Q.—What is the distinction between subjective provings and objective provings? You say you take both the subjective and objective symptoms? *A.*—Subjective symptoms are those symptoms felt by the patient and related by the patient. Objective symptoms are symptoms that are observed, changes that are observed by the physician in charge.

Q.—If the individual prover would perspire, that would be an objective symptom? *A.*—That would be an objective symptom.

Q.—And if you were informed that he had a pain in the back, you could not see that, and that would be a subjective symptom? *A.*—Correct.

Q.—If his face flushes, or anything that is observable, by pulse or eye or feeling, or in any other way by the doctor, that is objective, is that right? *A.*—Yes, sir.

Q.—Now, do you make any provings upon women? *A.*—Yes, indeed.

Q.—How do you obtain the drugs that are used in your school of medicine for diseases that are peculiar to women? *A.*—Those drugs are first proven on the healthy subjects, healthy individuals, and the symptoms are recorded and when we meet such a set of symptoms in the sick, those are the drugs that are given.

Q.—In making your provings in those cases, are the provings on women? *A.*—Yes, they are on women.

Q.—You make your provings—you ascertain, do you, of the medicines as I understand it—you ascertain what medicines are efficacious or indicated in diseases of women, by the provings on women? *A.*—Yes, sir.

Q.—Now, you, in your giving of a sketch of your method, of proving, you included something else which I did not quite catch

besides the symptoms, objective and subjective symptoms of the prover. What was the other? *A.*—Why, cases of poisoning, people who have been poisoned by drugs, the symptoms are observed, the physiological or toxic symptoms of the drugs are also noted and included in the provings.

Q.—In the case of poisons then, is that the way some of the poisons that you find to be poisons get into your pharmacopeia or into your medicine? *A.*—They are admitted, those symptoms are admitted as only exaggerated provings, because they are such.

Q.—You take that as a proving? *A.*—That is included in the proving.

Q.—What was the other? *A.*—The other is where there has been repeated curings of symptoms that have not as yet been observed in the proving, perhaps the proving is incomplete, that is, there has not been sufficient provers to make it out, yet the administration of the remedy on the indications that were present has cured certain symptoms a number of times, then those symptoms are admitted as being genuine symptoms of the drug, because of the drug's ability to cure them.

Q.—In that latter case, is that in the treatment of the sick or medicine to the well? *A.*—No, treatment of the sick.

Q.—That is a clinical observation of the action of the drug on the sick, is that right? *A.*—Yes, sir.

Q.—And those three constitute the proving of a given drug? *A.*—Yes, sir.

Q.—Are all drugs proved on the same person? *A.*—No, sir, rarely so. There are some provers who have proved more than one drug, but as a rule most of the drugs have been proven by a number of different provers, different sets of provers.

Q.—Do you make your provings in your school on neurasthenics? *A.*—No, indeed, they are not included as normal human beings.

Q.—Is it part of your method—or state whether it is or not, assuming that a drug has been tried on one individual, to try another on that same individual during any period that the first drug could have affected him? *A.*—Absolutely not.

Q.—Or her, either way. What precautions, if any, doctor, are taken to prevent imaginary symptoms being incorporated in the homeopathic materia medica, if you know? *A.*—The main precautions are that the—

Q.—Speak out loud. *A.*—The main precautions are that the provers, after being ascertained to be healthy are then told that some of them have no medicine. They are all taken—some of them are taking merely alcohol and water, unmedicated alcohol. They do not know which one of the provers are taking the nonmedicated fluid, so that they are used as controls, two or three of them in a class of provers are used as controls, and are given no medicine and yet they are told to record their symptoms and are examined the same way as the other provers who are taking the medicine.

Q.—What do you mean by "control?" *A.*—Those people who are taking no medicine who think they are taking medicine, and do not know but what they are taking medicine, are told to keep track of their symptoms in the same way as the others.

Q.—What is the purpose of that? *A.*—Simply to eliminate the possibility of imaginary symptoms creeping in.

Q.—Now, doctor, are you familiar with the two drugs known as—I withdraw that. Are you familiar with the drug known as carduus benedictus? *A.*—I am.

Q.—How long have you been familiar with that drug? *A.*—Practically during most of my practice.

Q.—State whether or not in your school of medicine, carduus benedictus is a drug in frequent use where indicated, in diseases of women?

Mr. T. J. Scofield:—That is objected to and I move to strike out the answer till I get my objection in. I am not objecting to his stating what he knows about it in his personal knowledge of the practice, but for him to be permitted to say that it is frequently used in his school, it seems to me would be very objectionable, and necessarily based on hearsay.

Mr. Walker:—I will change the question, and put it in another way.

Q.—How frequently within your knowledge, is carduus benedictus used in the homeopathic treatment for women's diseases?

Mr. T. J. Scofield:—That question, if the Court please, I object to.

The Court:—Your personal knowledge, not from reading, but from actual observation.

A.—Quite frequently.

Mr. Walker: *Q.*—Do you know what the custom is among your school of medicine in connection with that drug and its use? *A.*—Yes.

Mr. T. J. Scofield:—That is objected to, if the Court please.

The Court:—He may answer.

To which ruling of the Court the defendants, etc., excepted.

A.—It is in quite frequent use.

Mr. Walker: *Q.*—Now, state whether or not, Dr. Grimmer, the drug known as carduus benedictus has provings in your school of medicine? *A.*—What is the question?

Q.—Are there provings of that drug in your school of medicine? *A.*—There are.

Q.—Carduus benedictus? And when you speak of provings, you have reference to the methods that you have related as to the provings of drugs as just described, is that right? *A.*—Yes, sir.

Q.—Are you familiar with the drug known as viburnum prunifolium? *A.*—I am.

Q.—State whether or not that drug is used in your school of medicine in diseases that are peculiar to the female? *A.*—It is.

Q.—How long have you known of that drug as being in use in the troubles that arise—that are peculiar to the woman? *A.*—Since I have been in practice.

Q.—State whether or not, as far as—whether in your knowledge that is a drug of frequent use in the profession in your school? *A.*—It is.

Q.—Are you accustomed—have you knowledge of the custom in your profession in the use of that drug in diseases of women? *A.*—I have.

Q.—Now, Doctor, will you please tell the jury whether or not you are familiar with the organs of the woman, the genital organs, the organs of generation? *A.*—I am.

Q.—You say you are? *A.*—Yes, sir.

Q.—Before I get to that subject, Judge Hough calls attention to the fact that I neglected to ask you whether or not in your school of medicine viburnum prunifolium has been proven? *A.*—It has.

Q.—As you have illustrated before the method? *A.*—Yes, sir.

Dr. Grimmer stated that he has treated practically all functional disturbances peculiar to women. He does not perform surgery. He has used viburnum prunifolium and carduus benedictus many times with very good results. About 10 per cent. of female diseases are surgical cases and not over 5 per cent. in his experience. The witness stated that these medicines are of value when surgery is indicated.

The witness has treated all cases from early infancy to old age, through puberty to the menopause. The witness stated roughly, 50 per cent. of girls suffer at the time of puberty, and that some of the women who consult him seem to have a fair knowledge of what is the matter with them from their symptoms. On the other hand, many of them are mistaken. He does not always make an examination before he treats the case. At least 75 per cent. of his cases are treated without examination and he considers that he has had very excellent results. He considers that viburnum prunifolium and carduus benedictus are indicated in practically anything that women may have peculiar to them, any of their sicknesses. He mentioned amenorrhea, menstrual disturbances of all kinds, leukorrhea, inflamed conditions of the uterus and tubes, and the vagina, threatened abortion, all of which he has treated with good results. The witness mentioned cases of sterility which might be treated by medical means.

The witness has never used viburnum prunifolium and carduus benedictus in any way except in alcoholic solutions. He stated that the general rule in homeopathic practice is to give the smallest dose possible to effect the cure, as the best dose.

He defined high dilution as low strength.

Q.—Well, what is the theory upon which your school get results or use their medicines as to such small doses? *A.*—The theory is known as the law of similars; that which will produce on the healthy similar symptoms to what we meet in the sick will cure those symptoms in all curable cases. In some cases we all admit they are incurable. In all curable diseases that law is universal.

Q.—How do you establish the fact that there is efficiency in the various infinitesimal doses that you give? *A.*—By two processes. By proving it on the healthy and by curing the sick when we meet these similar symptoms in the sick.

Q.—In your provings, in your proving a drug do you prove it at different dosages—I withdraw that. How do you ascertain that any proving of the drug, the minimum or very small dose—has more efficiency—do you prove that? *A.*—By getting the effects on the healthy, giving it through long periods of time to the healthy until symptoms are developed. Very frequently our best provings are made with the high potency.

Q.—When you say high potency— *A.*—The 30th potency.

Q.—That means the smallest amount of drug, is that right? *A.*—Yes, sir.

Q.—You have said, doctor, that there are certain percentages which you treat without a physical examination. Well, why is that? *A.*—Why, a great many object to it, and in young girls we hesitate to make an examination unless it becomes absolutely imperative.

Q.—Do you make the examination wherever it is permitted? *A.*—Yes, sir, I do.

Q.—State whether or not as a physician you deem it advisable that where it can be done, the examination be made? *A.*—Wherever it seems necessary I always insist on it. Then if they refuse, of course, we can only treat them and tell them that the responsibility is with them.

Mr. Walker:—Now, doctor, is there any difference—well, I know this answers itself. I was going to ask the doctor, Judge, whether there was any difference in taking a drug that was poisonous and one that was not in the quantity that he would give it, and I see that would be ridiculous.

Q.—Doctor, what attention do you pay to the alcohol, as alcohol, in the remedies that you give in your profession? *A.*—We regard it as being negative, the alcohol that is in the drugs that we give.

Q.—Do you make any distinction between alcohol as alcohol and alcohol when used in combination with a drug or with medicines? *A.*—Yes. When we give alcohol as alcohol, we give it for the stimulating effects and give it in doses sufficient to obtain those effects.

The witness stated that he had heard the Home Treatment Book for Women read. He stated that he has treated cases of vaginitis and gonorrhea and he would consider medicine by mouth invariably indicated in these conditions and that this medicine contains alcohol. He would consider the alcohol in the hypothetic medicine as being negligible. He would not consider that the alcohol would heighten the passions of a girl at puberty, and he would not consider that it would give her an alcoholic habit. He stated that medicines are always indicated during pregnancy for symptoms. He would not consider the hypothetic medicine as injurious to the health because of its alcoholic content. Dr. Grimmer stated that a medicine could act both as a sedative and a tonic. He would consider that the hypothetic medicine might be indicated at the time of the menses, and that it could not mask a cancer. He would say that about 60 per cent. of women in the menopause suffer with distressful symptoms.

Q.—Now in your school do you combine drugs? *A.*—It is not in accordance with the tenets of the homeopathic teaching although many of the men, clinicians, clinically do combine and use the drugs and most of our pharmacists give out combinations with very good effects.

Q.—In your treatment do you give two different drugs to the same patient—I mean one drug following the other, like— *A.*—Very frequently one drug will complement another, yes.

Q.—How do you give it as you, yourself, practice? *A.*—In my own practice I give one drug at a time, and then if I get my results, I may follow it with another that is very similar to that drug.

Q.—That is, take carduus benedictus, for instance, at one stage, then could you follow that up, would it be proper in your method to follow that up with viburnum within an hour or two? *A.*—They are compatible.

Q.—Those two? *A.*—Yes.

Q.—Is that the way you use drugs when you use two drugs? *A.*—If I use two drugs, yes, sir.

Q.—What is the largest amount of alcohol in each dose of the homeopathic medicines which you give? *A.*—Most of the drugs that I give are given in dilution so that the alcohol is practically negligible.

Q.—A very small amount? *A.*—Yes, when I do use the tinctures, then it would be only a few drops of the tincture.

Q.—Doctor, have you looked into the subject at all as to what amount of alcohol can safely be taken by an adult without a bad effect?

Mr. T. J. Scofield:—I object to that.

Mr. Walker:—I mean in a medicinal solution.

Mr. T. J. Scofield:—If he knows anything about it, that is a different proposition.

THE COURT:—That is another way of asking him whether he knows anything about it.

To which ruling of the Court the defendants, etc., excepted.

Mr. Walker:—If he has not looked into it I won't press it.

A.—I have not specially looked into it, but I have a knowledge of the subject from reading.

Q.—What, in your opinion, doctor, as a physician, can an adult human being—the amount of alcohol that he can take in 24 hours with safety? *A.*—I would say that would vary with the individual.

Q.—Well, the minimum? *A.*—From three ounces say carried over a long period, not at one dose at one time, but diluted and given through a period of 24 hours.

THE COURT: *Q.*—Is that absolute alcohol or whisky? *A.*—Absolute alcohol.

Mr. T. J. Scofield:—Three or four ounces every 24 hours? *A.*—About three ounces of absolute alcohol.

Mr. Walker: Q.—That is diluted? *A.*—Diluted and given over a period of 24 hours in divided doses.

Q.—To what dilution would you say? *A.*—Oh, half and half.

Q.—That would be equivalent, would it, doctor, to six ounces of whisky? *A.*—About six ounces of whisky.

Mr. T. J. Scofield:—Well, six or eight.

THE COURT:—Depending on whether it was three or four ounces.

The Witness:—Yes. Well, I said three ounces was the minimum. I did not quite understand the question when it was first given, if it was absolute alcohol I would say three ounces.

The witness then defined inflammations of the uterus such as endometritis, and stated that when there are adhesions, the condition is not always surgical, and that there are such cases that may be treated by medicine through the mouth. The drugs mentioned are among those used for this purpose. The witness stated that these drugs are those indicated to make childbirth easier. Dr. Grimmer stated that he would not give a girl treatment at the time of puberty unless she had symptoms. If the hypothetic medicine was given to a girl at puberty who had no symptoms, it would not, in his opinion, hurt her or create an alcoholic habit.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that if a girl took the medicine at puberty without symptoms and continued it over a great length of time she might develop a proving and would then discontinue the remedy. He stated that if she continued to take the medicine past that time, she might develop something that would be harmful to her. Dr. Grimmer testified that in the dosage prescribed, 48 drops, three or four times a day, he did not think the alcohol would hurt her or create an alcoholic habit, and he did not think it would not hurt her over a period of years. She could take it right through a lifetime but he would not necessarily recommend it, nor would he recommend the medicine to a girl who had no symptoms because such are better off without any medicine.

The witness says that he does not agree that all girls should take this medicine at puberty whether they have symptoms or not. He considers that 50 per cent. of girls need medicine at the period of puberty. He stated that he arrives at this conclusion from the patients who come to his office, and that his statement is merely a rough sort of guess. The witness stated that in a susceptible individual, the hypothetic medicine might produce symptoms if taken sufficiently long, say from two weeks to a month. It might produce nervous symptoms, mental symptoms, functional disturbances of the menses, irregularities, etc. It would not produce gonorrhea; it might produce a slight degree of prolapse; it might produce catarrhal inflammation; it would not produce any sort of infectious inflammation. He stated that practically all inflammations are infectious.

He could not name any inflammation which was not infectious. The witness considers that the use of this medicine might in some way lower the number of inflammations that might follow and might lower the vitality of these parts if taken through a long period of time in sufficiently large doses. Dr. Grimmer testified he does not agree with the statement in the Home Treatment Book for Women that all girls should take this medicinal solution all through the period of puberty and that it can do nothing but good. He agrees with the part that it could do nothing but good. He does not believe in self medication; in a few cases it might lower the resistance and might lay the patient open to infection. He has always used carduus benedictus as a homeopathic tincture and viburnum prunifolium in the same way, and has never used them in combination. The witness stated that he could not tell the percentage of alcohol, but believes that they are made up with 90 per cent. of alcohol, although he has no absolute knowledge regarding the making of the tinctures. The witness stated that he teaches only the symptomatology and the therapeutic action of the drugs, and not the pharmacology of the drugs.

Dr. Grimmer testified further that he has never used carduus benedictus until within the last three months and that he used carduus marianus until up to the time he testified in Chattanooga for the Chattanooga Medicine Company. He took up the use of carduus benedictus as a result of the testimony he heard at Chattanooga. The testimony he had reference to was that of Dr. Ward and Dr. Thornton.

The witness stated that he has been in the employ of the Chattanooga Medicine Company since he testified in Chattanooga. The reason he came home from Chattanooga and began to use carduus benedictus is because he was struck with the possibility of its use. The witness says he has never made any provings of carduus benedictus. There are provings of viburnum prunifolium. He mentioned those of Hale and Higby.

The witness stated that the viburnum prunifolium in the hypothetic medicine would not be the homeopathic tincture and carduus benedictus would not be the homeopathic tincture. The witness stated that his experience with the remedies was only with the homeopathic tincture.

The witness stated that if it was assumed that the viburnum prunifolium in the homeopathic tincture was extracted with 90 per cent. alcohol and that the viburnum prunifolium as extracted with 20 per cent. of alcohol does not contain all

the medicinal properties. he would have no opinion as to the value of the viburnum prunifolium as contained in the latter mixture. The witness stated that if viburnum prunifolium is given to a girl who is not menstruating, it would be indicated for the sum total of her symptoms. In other words, the physician would have to direct the giving.

He stated that amenorrhea might be caused by a number of conditions. Viburnum is indicated if the patient has all the other symptoms for this indication. For this one must go to the provings. He mentioned Hale and Clark.

The witness stated that he does not know that Hale in 1882 stated that there were no provings of viburnum. The witness stated that he obtained the provings from Hale's new book, titled "New Remedies." In this book Hale does not give the complete provings but only some symptoms. Viburnum prunifolium is not a completely proved drug. The witness stated that he has used carduus benedictus perhaps a half a dozen times since February and with success and as a result, he feels qualified to say that carduus benedictus is a therapeutic agent. He gave it in the middle of March for a case of dysmenorrhea and also for a case of menstrual suppression. He would not give the names of the patients. He gave carduus benedictus to a girl with dysmenorrhea for a few days until the period had passed. He gave her a drop of the tincture to nine drops of alcohol, which is the second dilution. Of this he gave her five drops in a quarter of a glass of water and of this quarter of a glass of water he told her to take two teaspoonfuls every two hours until the pain was gone. She took it for about two days. He also gave it to her in April. She was so well in May that he discontinued the medicine. He would therefore consider that the medicine was indicated for that condition. He did not make any examination of the girl, so that he does not know whether there were any sort of uterine laceration, flexions, salpingitis, endometritis or inflammations of the tubes and ovaries.

In the case of suppression which he considers was caused by taking cold, he gave the same dosage. He gave it in the month of March. The girl who had dysmenorrhea he told to use the hot water bottle on the abdomen. The one with the suppression he told to go to bed and keep warm. The patient, however, remained "up and around." The witness stated that he thought the menses would probably have returned with no medicine whatever, but he believes that the medicine helped to bring them around. He gave carduus benedictus in two cases of leukorrhea during the month of April. One was a married woman, the other a girl 19 years old. He did not try to make any diagnosis of the cause in either case. He made no examination. The married woman told him that she had never borne children. He made an examination of her uterus a year or so ago, and he stated that there might be a vast difference in the position of the uterus after a year. He gave the medicine simply on the symptomatology. In the month of March, he gave carduus benedictus to one case with a general run down condition which he believed was due to overwork and poor nutrition. He had made no effort to determine the cause of the condition except by talking to the patient. He again refused to mention the names of the patients either privately or publicly and says that he has not mentioned them to the attorneys of the Chattanooga Medicine Company.

The witness stated that he has been proving the medicine on two cases, but he has not advanced sufficiently to say anything about it. One of them has been taking it for about a month and the other about a week. One is a married woman and the other a girl 21 years old. They had no symptoms of any kind. He made no examination to determine whether there was anything wrong with them nor did he make any other kind of an examination. He simply took the subjective history. The medicines have produced no action whatever.

Q.—Let us assume a case, doctor. Let us assume the case of a married woman who had a number of children, and that she had, following her confinements, a prolapsus of her womb to the extent it was down near the external opening; also that it was turned wrong side up— *A.*—Wrong side out?

Q.—Wrong side up. And that she could feel it in this abnormal position. Assume that this condition had existed for approximately two years. Have you an opinion as to whether, taking six bottles of the hypothetical medicine, or of the medicinal solution that Mr. Walker called your attention to, in doses of a tablespoonful three times a day, could turn the misplaced womb back the other way and restore it to its normal position?

Mr. Walker:—That is objected to. It is not cross-examination of anything.

The Court:—Is this a quotation taken from the book?

Mr. Walker:—No.

Mr. T. J. Scofield:—No.

Mr. Walker:—No. Not at all. He thinks he is construing some deposition of his own—testimony of his own.

Mr. T. J. Scofield:—He has said that to a certain extent the medicine might tone up the ligaments.

The Court:—We have nothing in the record at the present time to base this hypothetical question on, that I recall.

Mr. T. J. Scofield:—Yes, there is, absolutely.

Mr. Loesch:—It was read yesterday.

Mr. T. J. Scofield:—Read yesterday from one of their own depositions.

Mr. Walker:—It is not cross-examination of anything.

The Court:—Did this appear in the depositions of yesterday?

Mr. T. J. Scofield:—Yes.

Mr. Walker:—Something like it appeared in somebody's deposition, but it is not cross-examination.

Mr. T. J. Scofield:—Well, we can test his knowledge.

Mr. Walker:—No. You can call him, when you get done, call him as your witness—he is an expert—and pay him like we pay him, for coming for us.

The Court:—They have a right to test the general knowledge of this professional man. He may answer.

To which ruling of the Court the plaintiff, etc., excepted.

Mr. T. J. Scofield: Q.—What do you say, doctor?

The Witness:—Well, I would like the question again.

Mr. T. J. Scofield:—Read the question.

(Question read.)

The Witness:—I have an opinion, yes.

Mr. T. J. Scofield: Q.—What is that opinion? *A.*—I don't believe it would. I don't believe any medicine would. That is an extreme case.

REDIRECT EXAMINATION BY MR. WALKER

The witness stated that beyond being employed as an expert, he was not in the employ of the Chattanooga Medicine Company. The witness stated that it was not his experience that provers when they get symptoms go on taking the drug so as to keep them up, that in a case of a slow acting drug, it is necessary to keep up the practice for months even to a year.

RECROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that the quantity of the medicine in a dose does not make any difference just so it is under the toxic dose.

Adjournment was taken until 2 p. m., May 23, 1916.

May 23, 1916, Afternoon

TESTIMONY OF JOSEPH ALEXANDER DICKSON

The Court met pursuant to adjournment. Mr. Joseph Alexander Dickson was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. Dickson testified that he lives in Heaton County, Tennessee. He knows Rice Stanfill, who runs a store. The witness denied that he had held any conversation with Rice Stanfill concerning Wine of Cardui, and stated that he had never asked Rice Stanfill for a drink of Wine of Cardui or of anything else intoxicating. Mr. Dickson stated that if he ever saw a bottle of Wine of Cardui he has no recollection of it; that he has known Dr. W. B. Keaton for 20 years and that Dr. Keaton had never seen him with a bottle of Wine of Cardui.

Mr. Scofield called attention to the fact that Dr. Keaton made no statement whatever about Mr. Dickson. The Court ruled that this be stricken out.

Cross-examination was waived.

TESTIMONY OF NEWT G. GAILBRAITH

Mr. Newt G. Gailbraith was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. Gailbraith testified that he lives at Sunny Point, Chester County, Tennessee. He knows Rice Stanfill. The witness

stated that he was not in Rice Stanfill's store in 1912, that he passed through Ragen, Tennessee, in which Stanfill's store was located, but had not stopped. He had been there also in the fall of 1911. He stated that he had not taken a drink of Wine of Cardui in Stanfill's store nor anywhere else. He does not know Dr. W. A. Keaton personally, but he has known him by sight for three years. The witness stated that he has never had a bottle of Wine of Cardui. Mr. Gailbraith stated that he drinks; that Tennessee has been dry for five or six years but that liquor may be obtained from boot-leggers. It may be purchased in all kinds of bottles from nigger boot-leggers. He does not know that he has ever seen liquor in Wine of Cardui bottles. Mr. Gailbraith testified that he met Dr. Heizer and that Dr. Heizer wanted a statement from him to the effect that he had drank Wine of Cardui; that when speaking, Dr. Heizer took a roll of bills from one pocket and transferred it to another. The witness stated that he told Dr. Heizer that he had never drunk Wine of Cardui. Dr. Heizer offered to pay him for his time, but the witness refused it.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that he sometimes gets drunk; and that when he is drunk, he does not know what he is drinking if he drinks while he is in that condition. He would not know whether it was Wine of Cardui or Hostetter's Bitters. He goes on periodic sprees about every three or six months. The witness stated that he buys whisky from boot-leggers. If he cannot get whisky, he might get Manola. He is not sure whether he ever drank Hostetter's Bitters. The witness stated that he has been trading at Power's store at Ragen and that Dr. Keaton might have seen him drunk there at the time.

TESTIMONY OF L. V. M'MURRAY

Mr. L. V. McMurray was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. McMurray testified that he lives in Sardis, Tennessee. He knows Rice Stanfill and considers his general reputation for truth and veracity in his community as bad. He would not believe him on oath. The witness is a farmer and runs a saw mill.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that he has known Rice Stanfill for twelve or fifteen years. He had some dealings with Mr. Stanfill in 1912. Mr. Stanfill is a merchant operating a general store. There is one other general store in the community, that of Mr. Powers. There is a small settlement. Mr. Stanfill does a pretty good business.

The witness stated that he heard some parties talk about Mr. Stanfill in 1912. One of them was Mr. J. O., a farmer. The witness stated that Mr. J. O. stated that he had bought whisky from Mr. Stanfill and stated that Stanfill had said he would swear to a d—— lie before he would turn a man up for selling whisky.

The witness knows of no one else who has talked about Mr. Stanfill. The witness stated that he had been talking this matter over lately. The first person to speak to him about it was Mr. Hassel, a druggist in Sardis, who sells Wine of Cardui. The witness came to Chicago with Mr. Gailbraith. The witness drinks beer and whisky. The witness has seen Gailbraith drink. He expects to receive his expenses for coming to Chicago and a per diem, also, he does not know the meaning of the word "veracity."

TESTIMONY OF J. W. HASSEL

Mr. J. W. Hassel was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. Hassel testified that he resides in Sardis, Tennessee. He is a druggist. He was formerly postmaster and United States Commissioner in New Mexico. The witness stated that he knows Mr. M. T. Crouch. He considers Mr. Crouch's general reputation for truth and veracity in his community as bad and would not believe him on oath. The witness stated that there is only one drug store in Sardis. There are about five general stores, some of which carry a few drugs. The witness has been carrying Wine of Cardui off and on for about 20 to 25 years. The witness knows of no other store in that community where Wine of Cardui can be obtained except at Ragen, seven miles away or Scott's Hill. Crouch is a farmer living near Sardis. The witness stated that his books show that Crouch purchased only one bottle of Wine of Cardui in his store. He possibly may have bought some and paid cash.

The witness stated that there are about 500 people in the town, that his store represents approximately 1,000 families. He looks after his business personally. When he is away, he has a man in the store. He stated that Mr. Crouch usually pays cash for his Coca-Cola, but that is about all.

Mr. Crouch also paid for the goods he bought in the past week. The witness stated that he came to Chicago at the request of Mr. Richter, a representative of the Chattanooga Medicine Company, arrangements being made some two weeks ago.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

Mr. Hassel stated that Mr. Richter is not the man who sells him Wine of Cardui. Mr. Richter first came to his town two or three years ago and he has seen him several times since. He also went 18 miles to Lexington to see Mr. Richter. Mr. Hassel has sold Wine of Cardui off and on for 20 years.

Q.—Did you sell it while you were United States Commissioner? *A.*—No, I did not sell it while I was United States Commissioner—I sold it while I was U. S. Commissioner, yes.

Q.—Where was this? *A.*—In New Mexico.

Q.—Were you running a drug store? *A.*—A grocery store, and I handled Wine of Cardui.

Q.—And any other tonics? *A.*—Well, I think that is the only line, their's is about the only line I handled.

Q.—Didn't you sell Hostetter's Bitters down there? *A.*—No, sir.

Q.—Just selling Wine of Cardui and running the United States Government? *A.*—I think that was all I sold.

Q.—What did you do as United States Commissioner, take an acknowledgment sometimes? *A.*—I accepted and filed claims and contests, leaves of absence, and work of that kind pertinent to the land business there.

Q.—What did you do with them? *A.*—I sent them to the U. S. Land Office.

Q.—You had sort of a filing desk down there? *A.*—There was no great big amount of work, no, sir.

Q.—Then you don't mean to predicate any great amount on your being United States Commissioner, do you?

Mr. Hough:—That is objected to.

The Witness:—Well, I do not, no, sir.

THE COURT:—Yes, I wondered why it was gone into at all by either side.

Mr. T. J. Scofield:—They went into it and I wanted to go a little further in it, that is all.

Mr. Hough:—The statutes prescribes what the duties are of a United States Commissioner.

Mr. T. J. Scofield:—We are very much obliged to you to get the information on that subject.

Mr. Hough:—You are perfectly welcome.

Mr. Hassel stated that he is a licensed druggist, he also fills prescriptions, and he has had license to sell alcoholic preparations since a year ago June.

Q.—What is the date of that license? *A.*—Well, I could not state the date of that license just now. The license is dated back.

Q.—You had that license dated back some three years, didn't you? *A.*—Yes, sir—no, sir.

Q.—Because you had been selling stuff there in violation of the law? *A.*—No, sir. Now you hold on.

Mr. Fowler:—Let him explain.

The Witness:—Since June was a year ago, something like that, I believe.

Mr. T. J. Scofield:—Yes, you had it dated back three years, didn't you? *A.*—No, sir.

Q.—You did not? *A.*—No, sir.

Q.—What did you mean a while ago when you said that you had it dated back? *A.*—It was dated back from the time I filed the application for it, if I understand it right.

Q.—Had you ever had a license before that? *A.*—No, sir.

Q.—Were you not required, since that was dry territory down there, to have a permit or license for that sort of business? *A.*—No, sir, not unless you handle it.

Q.—You did handle it, didn't you? *A.*—No, sir, not prior to that.

Q.—When did you commence to handle it? *A.*—About that time.

Q.—What is it you refer to now that you commenced to handle? *A.*—Since June it was a year ago.

Q.—O, handle what? *A.*—Intoxicating liquors. You understand it is—let us get this clear. I had this license for this purpose in case that I should want to fill a prescription. I don't do this now. I do not handle it. I did not like it after I had the license, on account of the red tape there was to it, and I dropped it.

Q.—So you do not keep any liquors now? *A.*—No, sir.
Q.—Of any kind? *A.*—No, sir.
Q.—You don't fill any prescriptions? *A.*—No, sir.
Q.—But you do sell Wine of Cardui? *A.*—I do, yes, sir.

The witness stated that he handles about $40 worth of Wine of Cardui and Black Draught a year. That is at the wholesale price. There are other stores in that neighborhood that handle Wine of Cardui, one about three miles away. The witness stated that Mr. Crouch is a farmer. Mr. Crouch has had an acount in his store and the balance is 90 cents. He has never paid his account in full, but his bill at present amounts to 90 cents. Mr. Crouch has been trading with him for three years. The witness was asked what he understands as "general reputation" and he stated that there are some people who think that Mr. Crouch would sell his vote. The witness did not define what he understood by general reputation.

REDIRECT EXAMINATION BY MR. FOWLER

The witness stated that by general reputation, he meant by what he heard from people sitting around the stove in his store. The witness stated that he occasionally fills prescriptions and for that reason, he obtained the government license. The government license is only required where he would sell a quart to a pint of *spiritus frumenti*.

RECROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that when he said that he sold $40 worth a year, he included Black Draught and Wine of Cardui.

TESTIMONY OF A. S. MONTGOMERY

Mr. A. S. Montgomery was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. Montgomery testified that he lives in Sardis. He has been cashier in the bank and previous to that was in the mercantile business. He also carried a line of drugs in connection with his general store. He sold Cardui at that time; there was also a drug store which carried Cardui. He carried on a business with drugs some seven or eight years. The witness testified that in going through his books, as soon as this case came up, he was unable to find that Mr. Crouch had bought a bottle of Cardui from him. He may have paid cash for it.

Mr. Montgomery testified that he met Dr. Heizer on the stairway of the courthouse in Lexington. Dr. J. T. Keaton introduced him to Dr. Heizer. Dr. Heizer came into the bank the next morning and cashed a draft for $175 which was endorsed by Dr. John T. Keaton. The witness stated that Dr. Heizer had said that he had taken quite a lot of money to get evidence in the South, and that Dr. Heizer had said that he intended to spend several thousand dollars before returning home, perhaps as much as $10,000.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

Mr. Montgomery stated that he met Mr. Richter, Feb. 1, 1916, in the bank. Mr. Richter introduced himself and entered into a conversation concerning the lawsuit. The witness understands that Mr. Richter represented the Chattanooga Medicine Company. Mr. Richter came again about three weeks ago. The witness did not look about to see whether Mr. Richter had money promiscuously in his pockets. Mr. Richter arranged with the witness to come to Chicago and asked him to testify to the fact that Dr. Heizer had had a draft cashed and that Dr. Heizer had some money. The witness is here for that reason and expects to be paid for it.

TESTIMONY OF J. W. KNIGHT

Mr. Knight was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mr. Knight testified that he resides in Inverness, Florida. He has been chairman of the school board of the county and a member of the state legislature from his county. Mr. Knight testified that he had a daughter named Miss Mattie Clare Knight. Mrs. Knight has been dead since September, 1910. Miss Mattie Knight is also dead. The witness knows H. O. Byrd of Trilby, Florida. Dr. Byrd saw Miss Mattie Knight in June, 1912. The witness furnished her with all her spending money prior to that time. The witness does not know of her ever taking a drop of Wine of Cardui, prior to the time she was with Dr. Byrd. The witness testified that his daughter had a severe case of pleurisy. When she met Dr. Byrd, the doctor said she had a slight infection of one lung. She had been getting better. The witness stated that he did not hear his daughter tell Dr. Byrd that she had taken any Wine of Cardui.

The witness stated that Dr. Byrd took her into the sanatorium and kept her until October. In October, she was removed from the sanatorium and died a few days later. His daughter had no female troubles that he knew of.

Mr. T. J. Scofield stated that there was nothing he cared to ask the witness as there was no contradiction.

TESTIMONY OF MRS. A. O. PIERCE

Mrs. A. O. Pierce was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. FOWLER

Mrs. A. O. Pierce testified that she lives in Tuca, Florida, and she had a daughter named Grace who is now dead. This daughter was in charge of Dr. Byrd, the second or third week in May, 1915. She remained in Dr. Byrd's sanatorium five days. Her daughter had been married before she saw Dr. Byrd and had given birth to a child. She had laceration. She was separated from her husband, but had not had a divorce. The witness testified that her daughter had not drunk Wine of Cardui at home and that she had never known of her taking Wine of Cardui. The witness testified that Dr. Byrd did not refuse to take her daughter into the sanatorium but was anxious for her to come into the sanatorium.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

Mrs. Pierce stated that her daughter was in the sanatorium from Sunday to Thursday. She herself was not in the sanatorium, so she does not know anything about what her daughter told Dr. Byrd during that time.

DEPOSITIONS

Depositions were read and an adjournment was taken until May 24, 1916, at 10:30 a. m.

May 24, 1916, Morning

TESTIMONY OF DR. MALCOLM L. HARRIS

The Court met pursuant to adjournment. Dr. M. L. Harris was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. HOUGH

Dr. M. L. Harris testified that he is a physician practicing in Chicago. He identified a prescription as his own; he also identified a letter to another patient as his own. He has treated diseases of women. He stated that he used viburnum prunifolium early in his experience, then stopped using it and tried it again recently. He had not figured out exactly how much alcohol there was in each dose in the prescription he identified. When asked whether he had ever prescribed by mail without an examination he stated that under certain conditions he had. These conditions are if he knows the patient and knows the trouble, or if there is some emergency about the case which makes it desirable that the patient has advice pending his coming in for examination.

The cross-examination of Dr. Harris was deferred (see p. 307).

TESTIMONY OF DR. ARTHUR HORACE GORDON

Dr. Arthur Horace Gordon was called as a witness for the plaintiff in rebuttal.

DIRECT EXAMINATION BY MR. HOUGH

Dr. Gordon testified that he is a physician practicing in Chicago, where he has resided since 1884. He graduated from the Hahnemann Homeopathic Medical College in 1887, and has been professor of the theory and practice of medicine in this school. He conducts a clinic and is state medical examiner for a large life insurance company. Dr. Gordon testified that he is a member of the Chicago Homeopathic Medical Society, the Illinois Homeopathic Medical Society and

the American Institute of Homeopathy. He was a delegate to the International Society of Homeopaths in 1911, and has been chairman of the bureau of clinical medicine of the Illinois Homeopathic Society and of the bureau of materia medica and general therapeutics of the national society. He has been doing postgraduate work every year for the past fifteen years.

The witness defined a homeopathic physician, the rule of similars, etc. The witness stated that he knows viburnum prunifolium, carduus benedictus, viburnum opulus, and carduus marianus. He stated that carduus marianus and carduus benedictus are of the same family and their provings show that they are very nearly related, in their action on the human organism; the same pertains with viburnum opulus and viburnum prunifolium. The witness described the provings. He stated that they are very carefully done. He stated that carduus benedictus and viburnum prunifolium are indicated for amenorrhea, dysmenorrhea, metrorrhagia, vaginitis, menorrhagia, cystitis, endometritis, metritis, prolapsus, threatened abortion, sterility and leukorrhea. He has used the drugs himself with excellent results. The homeopathic school aims to use the smallest dose possible that will make a cure. He described tincture, lower and higher potencies, and stated that alcohol is used as a menstruum to dilute and keep remedies in good condition, and also for its extractive purposes. He stated that in their work, the homeopaths consider two ounces of alcohol about the limit that a human body can oxidize in 24 hours. He thinks that two ounces are about 480 drops.

Mr. Hough stated, "do you mean to an ounce?" The witness answered, "To the ounce." The witness stated that it is not strictly in accordance with the homeopathic teachings to combine drugs but as a matter of practice, homeopathic physicians often combine them. This is a personal matter with the physician. The witness stated that strictly homeopathic teachings do not recognize the synergistic action of drugs and do not advise mixtures. They sometimes follow up one drug with another and call this complementary action.

There was described to the witness the hypothetic medicine containing 60 grains of carduus benedictus or the extractives from it, and 6 grains of viburnum prunifolium to the fluidounce, in a menstruum of 20 per cent. of alcohol, in a dosage of a tablespoonful, either two or three or four times a day. He considered that such a mixture might be of service, although he has personally never used it. He would not consider the alcohol as having a deleterious effect on a girl at puberty nor would it, he believed, tend to excite her passions, or create a habit. The witness stated that he did not believe that there would be any danger in administering such a medicine to a woman at the menopause. Such medicines are indicated during that period. He thinks it would be all right for a woman who had disturbing symptoms to take this during the menopause, and that it would be all right for a young girl who had disturbing symptoms at puberty to take it. He considered also that carduus benedictus and viburnum prunifolium are indicated during pregnancy to make childbirth easier and for any disturbing symptoms.

The witness stated that in homeopathic preparations, of these drugs from 50 to 60 per cent. of alcohol is used. These drugs were originally used as a tea or an infusion by extraction of the medicinal properties by hot water. He does not know the exact percentage of alcohol required to extract the virtues of the drugs. The witness stated in what way these drugs would benefit cases of sterility, and in what way they could benefit infection; namely, by building up the defensive powers of the body. Uterine displacements would also be benefited in this way. In the same way, he stated they would benefit gonorrheal infections. The witness stated that both of these drugs are in the homeopathic pharmacopeia which indicates that they have been proved and accepted by the committee on drug provings of the American Institute of Homeopathy.

The witness did not think that this medicine would mask a cancer.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness stated that in a large majority of cases, cancer progresses to fatality. He has seen cases apparently cured by arsenic given homeopathically in one case. Cancer of the stomach was diagnosed from the symptoms of the patient with a cure following the giving of arsenic. There were no exploratory incisions. The witness stated that cases of syphilis are not the same as cancer, as the cachexia of cancer is peculiar to itself. He would not attempt to diagnose cancer of the stomach by reason of the cachexia only. The witness mentioned emaciation, and pain in the pyloric region of the stomach as symptoms of cancer. He stated that pain might also mean gallstones, or an ulcer of the stomach, and that there are many things which might produce these symptoms, but the pain of cancer is not the same in his experience. He knows the pain only as it is described by a patient.

Another symptom was the coffee-ground vomiting, which he thinks is peculiar to cancer. He does not think that this might come from any condition of liberating blood in the stomach. He does not think it would come from an ulcer.

Q.—What produces the coffee-ground appearance? *A.*—Disintegration of the blood.

Q.—It is the action of the gastric juice, isn't it? *A.*—I do not think that I am a sufficient specialist in stomach diseases to absolutely be sure of that, but that is my impression, that it is the result of the diseased condition there from—of the cancerous degeneration as well as the action of the gastric juice.

Q.—You diagnosed this condition, didn't you? *A.*—I did with the help of the laboratory.

Q.—Oh, then, you did not depend upon yourself in diagnosing the condition? *A.*—Not entirely.

Q.—You say you did with the help of the laboratory. What do you mean by that? *A.*—They made an examination of the contents of the stomach.

Q.—Did they find any cancer cells? *A.*—As I remember the examination, they did not.

Q.—They did not? What did they find? *A.*—They found lactic acid.

Q.—Found what? *A.*—Lactic acid.

Q.—Why, you have that in the stomach when you drink milk, don't you? *A.*—It depends on whether the milk is sweet or sour.

Q.—Whether it is sweet or whether it is sour, don't you have lactic acid in the stomach after you drink milk, sweet or sour? *A.*—I do not think so. My opinion is—

Q.—Do you know? *A.*—My opinion is that we do not.

Q.—I say do you know whether it is or not, whether you would or not? *A.*—I am not a laboratory man, Mr. Scofield. I rely for my information on those points, on the laboratory men.

Q.—Doctor, lactic acid is the acid of milk, isn't it, and is always in it whether it is sour or whether it is sweet, isn't that right, in the process of digestion? *A.*—I do not think so, Mr. Scofield, I do not think so. I am not positive, though. I am not, as I have said before—I am not competent to tell you.

Q.—You used the word "lactic acid." Tell us what lactic acid is as you find it in the stomach under such conditions and why do you attach so much importance to it? *A.*—Because if you give a test meal, so far as my knowledge of those test meals go, you do not find lactic acid in a healthy stomach.

Mr. Hough:—I did not want to make an objection earlier, but it does not seem to me that this is directly on the point. I thought maybe Mr. Scofield was interested and wanted to find out, just on account of curiosity.

THE COURT:—Well, it is testing the general knowledge of the witness.

Mr. Hough:—Yes, but at the same time it was not responsive to any question I asked. I simply asked whether this medicine would mask the symptoms of cancer.

THE COURT:—Yes.

Mr. T. J. Scofield: Q.—What else did you depend upon in diagnosing the cancer of the stomach at that time than the lactic acid and the coffee-ground condition of the blood? *A.*—Pain.

Q.—What sort of pain was it? *A.*—Sharp.

Q.—You diagnosed the condition on that? *A.*—Not on the pain alone; from the symptoms and physical signs, as I before stated.

Q.—There were three things, the lactic acid, coffee-ground color of the vomited matter, and the pain. There are three things? *A.*—And the cachexia.

Q.—What? *A.*—The cachexia and emaciation.

Q.—That is the appearance? *A.*—Yes, sir, and the physical signs

Q.—Either one of those things that you have enumerated and upon which you say you diagnosed this condition may be produced by other conditions, might they not? *A.*—I don't believe that those symptoms complex could be produced by other conditions, and we have not gotten yet to the physical signs.

Q.—Now, then, doctor, you said a while ago that cancer might be produced by ulcer, ulcerous conditions of ulcer of the stomach? *A.*—It usually precedes cancer.

Q.—Can't all that condition that you have just referred to, that is, all those symptoms that you have spoken of, result from an ulcerous condition of the stomach, without cancer? *A.*—I don't think so. I don't think you will get that symptom complex.

Q.—Have you ever had any other experience in considering the question than in that one case where you have cured cancer with medicine? *A.*—Yes, sir.

Q.—How many different times? *A.*—Well, I could not state in the length of time it runs over, so many years, perhaps 28 or 29 years as mine has, immediately, without thought, how many times, but I have seen and treated a great many cases of cancer of the stomach.

Q.—You have cured a great many cases of cancer, haven't you? *Mr. Walker*:—He did not say that.

Mr. T. J. Scofield: *Q.*—Have you or not? *A.*—I have cured two that I am fairly positive of. One in my own private practice, and this one that I am positive of, as far as I can be positive of anything.

Q.—How is that? *A.*—I am as positive of it as far as I can be positive of anything.

Q.—Did you use arsenic in both cases? *A.*—Yes, sir.

Q.—In what sort of dilution? *A.*—I used the 6-X potency.

Q.—You used that in a low dilution? *A.*—No, sir, that is considered a high potency.

Q.—What is 6-X? *A.*—Well, 6-X is the tincture diluted six times.

Q.—Well now, explain that to us so that we can understand what you mean by it. How much arsenic was there? How much did you take first? *A.*—I gave her three tablets.

Q.—What? *A.*—Three tablets of arsenic, 6-X.

Q.—Three tablets what? *A.*—Six-X. Do you wish me to figure it out?

Q.—First, what is 1-X? *A.*—One-X is one-tenth of a grain.

Q.—Now, what would 2-X be? *A.*—One-one-hundredth of a grain.

Q.—What would 3-X be? *A.*—One one-thousandth.

Q.—What would 4-X be? *A.*—One ten-thousandth.

Q.—What would 6-X be? *A.*—One millionth.

Q.—That is, one millionth of a grain of arsenic? *A.*—Yes, sir.

Q.—And that is the way you treated cancer of the stomach, is it? *A.*—Yes, sir, and I have full belief in its curative power.

Q.—With arsenic. That arsenic was just the same as any other arsenic? *A.*—Yes, sir.

Q.—So that you used in the treatment of that case, one millionth of a grain per dose? *A.*—Yes, sir.

Q.—How many doses did you give? *A.*—Well, it was more than one-millionth of a grain because I gave three tablets at a time. It would reduce just the same.

Q.—Then you had three-millionths of a grain? *A.*—Yes, sir .

Q.—At a dose? *A.*—Yes, sir.

Q.—You did not think there was any danger of poisoning the man, did you, doctor? *A.*—Not at all, although I have seen—

Q.—How many?—

Mr. Hough:—Let him finish.

The Witness:—I have seen marked aggravations.

Mr. T. J. Scofield:—I am speaking of this time.

The Witness:—(Continuing.) From those doses.

Q.—I am speaking of this man, and asking you whether you thought there was any danger of poisoning him? *A.*—No, I did not.

Q.—Now, you sometimes go beyond in your work 6-X don't you? *A.*—We often use the thirtieth, yes, sir.

Q.—What would that represent, could you estimate it? *A.*—I would have to figure it out, thirty ciphers.

Q.—It would take a row of figures pretty near across this room—the fraction of a grain? *A.*—Not so far as all that.

Q.—How do you progress, by hundredths or thousandths or what? *A.*—By tenths.

Q.—Yes, but past three, don't you go by hundredths? *A.*—Oh, you mean in the amount of medicine?

Q.—Yes? *A.*—Yes, sir.

Q.—After you pass six, how do you go? *A.*—Well, figure it out.

Q.—I am asking you to figure it out. You are a doctor, I am not. *A.*—It is mathematics.

Q.—You are a physician, and you know what you give, don't you? Suppose it was 10-X, how much are you giving your patient, what part of a grain? *A.*—Well, we figured the 6-X up to a millionth, you can carry it out by adding ciphers, you add one cipher for each one.

Q.—How about 10-X? *A.*—I have never estimated it.

Q.—Have you ever given it? *A.*—Yes, sir.

Q.—Given it up as high as 30-X? *A.*—Yes, I have given it up as high as 200-X.

Q.—Up as high as 200-X? *A.*—Yes, sir.

Q.—But you don't know how much there would be in it? *A.*—I have never figured it out, but I have full confidence in its curative power.

Q.—Isn't 6-X one-billionth of a grain, instead of a millionth? *A.*—It may be, I did not figure it.

Q.—So that you don't know how much you are giving? *A.*—We know what potency we are giving, and what we expect from it.

Q.—Now, getting back to the cancer question. You have never cured it with anything else than that sort of a dosage of arsenic? *A.*—In each case that I treated, that was the main prescription. I did use other medicines intercurrently for other conditions, but that was the main treatment. It revolved around that treatment, small doses of arsenic.

Q.—The other medicines given were for other conditions? *A.*—Yes, sir.

Q.—You did not use viburnum prunifolium? *A.*—No, sir.

Q.—You did not use carduus benedictus? *A.*—No, sir.

Q.—Nor did you use a combination of the two in a 20 per cent. alcoholic menstruum, did you? *A.*—No, sir.

Mr. Walker:—In cancer of the stomach?

Mr. T. J. Scofield:—Well, suppose it had been cancer of the womb, would you have used the same treatment that you did? *A.*—If it were indicated.

Q.—When you say if it were indicated, what do you mean by that, doctor? *A.*—I mean that if the drug—if the picture of the disease fits the picture of the remedy.

Q.—Now, let us take that—you have used that term "if it were indicated," practically every time you have answered Mr. Hough's questions. Now, let us commence with one of the first things that you talked about, which was amenorrhea, and in which you said that this medicine, such as he described to you (which simulates Wine of Cardui as I understand it), would be good if it was indicated. Is that what you said? *A.*—Yes, sir.

Q.—How often do you think you would find it indicated in amenorrhea? *A.*—That is a question that would be impossible to answer.

Q.—Yes. Now, let us understand what you mean by "it would be a good medicine, if indicated." How would you determine the question as to whether it was indicated or not? *A.*—Well, we have a certain list of remedies that we think of, when a certain condition appears in a diseased subject. We have those in our mind. They have certain given, noted symptoms, which are strong, and frequently occur to us. Then we take the case, and we take our books from our library shelves (just as you do, I suppose, when you have a case that needs looking up), and we fit the remedy to the provings and to the symptoms as they are given in those reference books.

Q.—All right. Now then, doctor, in that case, the case of amenorrhea, you go to the books, and you hunt up the list of symptoms that are indicated in that condition; is that right? *A.*—Yes, sir.

Q.—There are a lot of different drugs which you give in your school that are indicated, as you say, for these different sets of symptoms? *A.*—Yes, sir.

Q.—There might be 50 or 60 or a hundred different drugs that might be given under these circumstances, depending upon what the symptoms were; isn't that true? *A.*—Yes, sir.

Q.—All of them for amenorrhea; isn't that true? *A.*—Yes, sir.

Q.—So that, in determining what you will give for amenorrhea, you would not give viburnum prunifolium or carduus benedictus in all cases of amenorrhea; would you? *A.*—No, sir.

Q.—But you would try to see first what the particular symptom was, or set of symptoms, and having ascertained that, you would then go to your medicines, and your provings, for the purpose of saying what particular medicine or medicines were indicated for those particular purposes? *A.*—Yes, sir.

Q.—Now, that being true, it is not very often, is it, doctor, that in the treatment of amenorrhea you use the same medicine? *A.*—Yes, because—we do often use the same medicines.

Q.—Then you often use it. You don't always use the same medicines? *A.*—No, sir.

Q.—There are—frequently you find a set of symptoms that induces you or induces within you the belief that the proper treatment is a certain medicine? *A.*—Yes, sir.

Q.—And then you find for amenorrhea certain other symptoms that were indicated, that induced you to believe that another medicine is the medicine to use? *A.*—Yes, sir.

Q.—And then you find a set of symptoms that will, in accordance with your school, require a different medicine? *A.*—Yes, sir.

Q.—And so on through, until you take the gamut on some fifty or sixty different medicines that you give, depending upon what the symptoms were; isn't that right, doctor? *A.*—Hardly as many as that.

Q.—Well, a great number? *A.*—A number.

Q.—A great number—a number? *A.*—Yes, sir.

Q.—In other words, now, if I understand you, doctor, you don't want to be understood here as saying that any one remedy or combination of remedies responds to the symptoms of amenorrhea? *A.*—No, sir.

The witness then stated that in treating amenorrhea, he takes into consideration the causes and mentioned the various causes of amenorrhea. He stated that the treatment would vary with each of the cases and be determined on the symptoms. He would not give the same medicine each time to a woman with amenorrhea; some medicines are more frequently indicated than others. He would not undertake to treat all cases with certain drugs because they are indicated oftener than the others. It was necessary in treating diseases, he believed, to diagnose the condition, and it is best to have a physician for this purpose; in most cases an examination is necessary, in some cases the symptoms are sufficient so that an examination is not necessary for a treatment. If new symptoms manifest themselves, it would be necessary to change the medicine and he would change it. Such new symptoms frequently occur in diseases. The witness stated that in answering Mr. Hough, when he stated that the hypothetic medicine might be good for various conditions, when it was indicated, he meant to say that if it met the requirements of certain symptoms, he would give it and if he did not meet the symptoms, he did not give it. There was described to the witness a hypothetic case of a married woman who had suffered two miscarriages, after which she became pregnant and gave birth to twins. Following the delivery of the twins, there was a uterine pro-

lapse so marked that the womb might be felt by the patient just inside of the opening.

He stated that the hypothetic medicine would not cause the womb to return to its normal position. He stated that he could not tell whether the woman would be able to feel the womb going back to this normal position because he is not a woman and has no idea as to how a woman would feel in such a condition.

The witness then stated that one method of proving medicine was by trying it on a patient with symptoms, and in this way drugs might be proved for use in threatened miscarriage. The witness did not remember of having heard that a woman may go to bed threatened with a miscarriage and so recover. In using viburnum prunifolium, he uses the homeopathic tincture or the fluidextract. The testimony given referred to the use of this preparation, the same thing applied to his use of carduus benedictus. There was described to the witness the hypothetic case of a tumor developing in a woman on the left side of the abdomen just below the "short ribs." It was hard in the center and somewhat softer on the outer edges. It increased in size for six months until it required both of the woman's hands to cover it. It could plainly be seen through the clothing of the woman when she was dressed. In addition to this the woman suffered from headaches and pains in the back; her menstrual periods were not regular, and she had menorrhagia.

The witness stated that the hypothetic medicine might be indicated in such a condition. He was asked to assume that the woman began taking this medicine, in tablespoonful doses three times a day. It was his opinion that it was possible for the tumor to begin becoming less in size after using this medicine two or three days and that after using three bottles of this medicine over a few months, the tumor would grow so small that it could not be felt, and that after using four bottles, six months from the time it was begun, the tumor would entirely disappear.

The witness reiterated that such a case was possible.

REDIRECT EXAMINATION BY MR. HOUGH

The case was again described to the witness by Mr. Hough. The witness stated that very likely the woman was mistaken in her diagnosis. He would not say that she was mistaken as to her symptoms. The witness stated that he has known cases of slight prolapse, where after taking medicine the womb has gone back into place. The witness knows of drugs used by allopaths in homeopathic doses. He mentioned tuberculin which he says is given in infinitesimal doses. He mentioned adrenalin chlorid as of the same class.

RECROSS-EXAMINATION BY MR. T. J. SCOFIELD

The witness testified that he considers tuberculin a medicinal substance. He stated that it was a poison, consisting of the germs of tuberculosis ground up. Adrenalin is an exceedingly violent poison. He did not know whether tuberculin was as dangerous as strychnin. He would not consider a thirtieth of a grain as a safe dose.

REDIRECT EXAMINATION BY MR. HOUGH

The witness stated that arsenic is a very powerful poison. He would give an infinitesimal dose about once in three hours.

TESTIMONY OF DR. MALCOLM L. HARRIS

Dr. Malcolm L. Harris resumed the stand for the plaintiff.

CROSS-EXAMINATION BY MR. T. J. SCOFIELD

Dr. M. L. Harris stated that he discontinued viburnum because he did not get any favorable results. He used it again comparatively recently, to see if there had been any change, and see if his former opinion of it was still correct, and he found that it was. He did not get any favorable effects from viburnum prunifolium.

REDIRECT EXAMINATION BY MR. HOUGH

Mr. Hough asked the witness how he knew the effects of the prescription on the patient. The witness stated that the prescription had nothing whatever to do with the letter which had been identified, and requested Mr. Hough to identify the patient for whom the prescription was given; this was not done.

Adjournment was taken until 2 o'clock of the same day.

(To be continued)

Correspondence

The Index Catalogue and Index Medicus

To the Editor:—In THE JOURNAL, July 1, p. 39, your editorial writer indulges in certain comments on the *Index Catalogue* and the *Index Medicus* which seem to be conceived in a spirit *propter invidiam*, inasmuch as these publications seem to be regarded as commercial competitors of the *Quarterly Cumulative Index* issued by the Association. Without wishing to criticize this publication, which undoubtedly has its proper use and value, it should be obvious that the *Index Catalogue* and *Index Medicus* do not and have never entered into competition with any publications or bibliographic compilations whatever, and it seems strange that any new publication of the kind specified should be pitted against them, as the *Index Catalogue* is a government publication and the *Index Medicus* is published by a scientific institution.

The *Index Catalogue* and the *Index Medicus* were originally designed as complete bibliographies of the literature of medicine through the periods of time covered by them, and, as such, they have a definite and positive value for the workers of the future as well as for those of the present. There are many bibliographies of the different branches of medicine which are apparently not known to the writer of the editorial, but the great drawback in all is that they are confined mainly, sometimes exclusively, to the language of the countries in which they are issued, which is not the case with the *Index Catalogue* and the *Index Medicus*. That the latter indexes may, in the words of your editorial, "leave much to be desired" is also the case with any scientific publication, except perhaps a table of logarithms. In this sense, even such classical bibliographies as those of Laehr on neurology or Abderhalden on alcoholism left something to be desired a few years after their respective dates of publication. In regard to the statement that the *Index Catalogue* is "out of date" and that the *Index Medicus* is "never up to date," I beg to say that such criticisms have never, to my knowledge, been advanced by any reasonable person using them extensively. The slow rate of production of recent numbers of the *Index Medicus* is due to the fact that since the outbreak of the European war, the falling off in amount of medical literature has been so pronounced that it has been actually necessary to wait for the accumulation of the proper amount of material before sending copy to the printers; but the monthly numbers contain all that has accumulated up to the time of publication. Thus, the *British Medical Journal*, which contained 1,652 pages in 1913, contained only 1,124 in the latter half of 1914, 1,104 pages during the first half of 1915, and probably less than 1,000 pages during the first half of 1916. The medical literature of France has fallen off to an even larger degree, that of Belgium is practically extinct, little Russian and no German literature whatever is now coming into this country at present, and with the exception of Italy, the output of the other combatant countries is fitful and irregular. As soon as the pressure of the war is removed and the backwash of literature becomes obtainable, it is proposed to print the accumulation in bulk and as rapidly as possible in the *Index Medicus*. The necessity of keeping the present numbers of the periodical up to a certain standard of size is therefore obvious. The annual indexes of the *Index Medicus* for 1912, 1913 and 1914 were issued early in July, 1913, 1914 and 1915, respectively, and that for 1915 will appear in a few days.

F. H. GARRISON, M.D.,
Surgeon-General's Office, Washington, D. C.

[COMMENT.—If our editorial carried the impression that the *Quarterly Cumulative Index* is to compete with the *Index Catalogue* and the *Index Medicus*, the language must have been obscure. On the contrary, our editorial pointed out the necessity for an index supplementary to the two mentioned—one that would be of practical value to the every-day worker in literature. The two indexes issued from the Surgeon-General's office are inclusive and exhaustive; the *Quarterly Cumulative Index*, it is definitely stated, will not be either. It will contain an index of the cream of the medical literature of the world, up to date and of easy reference, but will in no sense be comparable with the *Index Medicus* or the *Index Catalogue*.—ED.]

Health Conditions in British Somaliland

To the Editor:—Through the courtesy of the medical officer of the Somaliland Protectorate, I have come in possession of the following interesting information regarding a section of Africa concerning which the available information is far from satisfactory and complete.

"Leprosy is of extreme rarity in British Somaliland, though the Somalis seem to have some traditional knowledge of it. I fancy any such patient would be killed for purposes of public safety anywhere in the interior. In this connection it is of interest that although sea fish of many varieties are plentiful all along the coast, no Somalis will eat them, though the Arabs, Indians and Europeans do. There is no reason for this beyond custom, which is of a strength unknown among western nations.

"Malignant diseases, cancer and sarcoma of all varieties are practically unknown. In the course of twelve years I have only had one case and that proved to be a transitional form of growth occurring at the pylorus and junction with the duodenum. Rodent ulcer exists but is very rare also.

"I am completely at a loss as to why there should be no breast cancers when the skin must so frequently be subject to excoriation from sand. But as regards intestinal new growths, it is noteworthy that this collection of tribes (1) never consistently overeat; (2) never make a daily practice of eating meat; (3) never eat pork or eggs under any conditions whatever, including lard or eggs if contained in cakes of any kind; and (4) seldom, if ever, eat any vegetables. Of the things they do and do not eat, the following are the most noticeable:

"(*a*) They live by preference on camel, goat and cow's milk, occasionally killing and eating these animals.

"(*b*) Luxuries are: tea (no coffee is drunk nearer than Abyssinia, where the husk only is used, the bean being considered too heating; dates, which are imported, as is tea, and which are invariably eaten and swallowed with the date-stones—why, it is difficult to say except that it is custom. Human droppings almost invariably contain about a dozen of these; sugar is a much valued food, as is honey; tobacco is not smoked or chewed by more than perhaps one in 300 Somalis and shows no signs of coming into favor, though extensively used by the Arabs. Any form of stimulant except tea—that is, coffee, tobacco, alcohol, kat (a shrub of mildly astringent properties with no alkaloids contained in it) is never taken. The result as regards surgical operations on such people, using chloroform almost invariably, as the anesthetic, is most satisfactory; none of the troubles frequently met with elsewhere ever occur."

The reports of Dr. A. J. M. Paget, senior medical officer, have thrown much light on obscure medical questions regarding the primitive population of this important region, and the preceding statement may therefore be accepted with confidence as being both conservative and conclusive.

The general health conditions affecting the European population appear to be fairly good. The country is more or less liable to native uprisings, and a voluminous correspondence on the subject has been published by the British government. The heat in the coast belt is excessive, the country being unusually dry and arid. The fine sand which is held in the air during the summer months precludes flies or mosquitoes. According to Dr. Paget, "Malaria is found to be chiefly propagated through the water vessels standing in the houses, this being difficult to control in any way without the aid of an inspector or staff of any kind. A practically complete clearance of all mosquitoes occurs in the summer, owing to the sand storms." The sanitary situation is described by the doctor in the statement that "the general native attitude is that it is fashionable to show a complete disregard of any form of European education, teaching or advice."

Frederick L. Hoffman, Newark, N. J.
Statistician, the Prudential Insurance Company of America.

Alcoholism at Altitudes.—There is another very striking fact in mountain climbing worthy of note, namely, that persons who consume much alcohol are much more susceptible than others to mountain sickness. This is akin to the fact noticed by us that alcoholics are also very susceptible to poisoning by carbon monoxide.—Glaister.

Queries and Minor Notes

Anonymous Communications and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted, on request.

SKIN MANIFESTATIONS IN PELLAGRA

To the Editor:—1. Are skin diseases in general, or the skin manifestations in pellagra in particular, affected favorably or unfavorably by the deficiency of atmospheric pressure, at an altitude of 7,000 feet in the Rockies?

2. The hair fell out *only* on the extremities, some four years ago, in a case of pellagra with no specific taint. Is such loss not unusual in pellagra? Will the hair return when the skin manifestations disappear?

3. Are the skin or the psychic manifestations the last symptoms to disappear in pellagra? Which and, if neither, what?

4. Will the change in the viscosity of the blood, at the altitude mentioned play a part for or against a pellagrin?

5. Is a neurotic, who is a pellagrin, more apt to have one of the neurotic skin diseases as a complication, than otherwise?

6. Will any one, and especially a pellagrin, be more disposed to have any one of the circulatory diseases than otherwise, at the foregoing altitude. If so, which?

James R. Anthony, M.D., Indianapolis.

Answer.—1. Neither skin diseases in general nor the skin manifestations of pellagra in particular appear to be unfavorably affected by the deficiency of atmospheric pressure at an altitude of 7,000 feet. With regard to pellagra, no evident relation has been shown between this disease and the altitude. It is common in the Tyrolean Alps and also in lower Egypt. The latter country is, in part, below the level of the sea and rises only at the rate of 13 inches to the mile. The character of the disease and its manifestations are the same at the two levels. While authorities differ as to the modus operandi, they are all agreed that the colder climate of a high altitude is favorable for the pellagrin. Pellagra is not a winter disease. A pellagrin going to the Rockies should be specially cautioned against the risk of sunburn.

2. Loss of hair over limited areas, especially symmetrical areas, is known in pellagra. If the skin lesions have not proceeded to the ulceration stage, the hair will usually grow again.

3. There is no rule as to which disappear first in pellagra, the psychic disturbances or the skin lesions; but when the former are advanced to the degree which is seen in asylums for the insane, it is almost invariably the case that during cure or partial cure the skin lesions clear up first. On the other hand, slight recurrences of the erythema only are far from uncommon.

4. There is no reason to suppose that the effect of altitude on the viscosity of the blood would be such as to affect the pellagrin one way or the other.

5. Pellagra skin manifestations seem to be quite *sui generis;* therefore there is no reason to suppose that a neurotic who is a pellagrin will be especially liable to neurotic skin diseases. It should be remembered that every pellagrin is subject to nervous disease symptoms.

6. A pellagrin, as such, would not be liable to circulatory diseases on account of the altitude. With regard to the more general question, persons with arteriosclerosis and with uncompensated heart disease should not go to high altitudes; those with fully compensated cardiac diseases may visit the mountains, but should be cautioned against taking much exercise, especially at first. When the cardiac trouble is due to general poor health, a visit to the mountains, unless contraindicated for other reasons, would be generally beneficial.

IS DOUBLE VASECTOMY JUSTIFIABLE?

To the Editor:—1. Will you kindly state the effect of double vasectomy on the sexual life of man? 2. Would it be considered "good form" to sterilize a poor man who has a large family and who realizes that he has more children now than he can educate? 3. Would a man be protected from the law if he secured the request of such a person in writing before performing this operation?

R. B. Gaston, M.D., Lebanon, Tenn.

Answer.—1. Double vasectomy, it is generally believed, has no effect on sexual desire or power. It only renders the individual sterile.

2. A surgeon doing a double vasectomy with poverty as the only indication would lay himself open to severe criticism, to say the least.

3. There is no specific law that would make a licensed surgeon liable for performing this operation with the full consent of the patient, if the operator considered it justifiable; but the mere written consent on the part of the patient would not prevent suit being brought against the surgeon. See Queries and Minor Notes as follows:

Effect of Cutting the Vas Deferens: THE JOURNAL, Dec. 13, 1913, p. 2179.

Vasectomy: Technic and Effect on Sexual Intercourse, March 8, 1913, p. 769.

HEXAMETHYLENAMIN IN ANTERIOR POLIOMYELITIS

To the Editor:—During an outbreak of poliomyelitis some years ago, Flexner of the Rockefeller Institute recommended hexamethylenamin as a preventive, as he found that monkeys, inoculated with poliomyelitis, on being treated with this drug did not suffer to the same extent as if they had had no hexamethylenamin, and sometimes escaped an attack entirely. Will you be good enough to let me know what the present status of the use of this drug as a preventive may be?

H. W. HILL, M.D., London, Canada.

ANSWER.—It has been shown that hexamethylenamin has no germicidal activities, except in an acid medium. Therefore, it is of special value only in infections of the pelvis of the kidney, ureters, bladder and urethra when the urine is acid. It cannot be expected to exert germicidal activity in the spinal fluid, which is alkaline.

NINE USEFUL DRUGS

To the Editor:—In my grip which I carry with me I have a case of nine medicine bottles. Would you make a suggestion as to the most useful drugs to carry with me?

MORRELL SIMPSON, M.D., ——, Ind.

ANSWER.—We submit this communication to our readers. If the replies are adequate in quality and quantity, an analysis will be published later.

Medical Education and State Boards of Registration

Hawaii Report

Mr. Kirk B. Porter, secretary of the Hawaiian Territorial Board of Health, reports that eight candidates were licensed recently in Hawaii. The following colleges were represented:

PASSED

College	Year Grad.	Total No. Licensed
University of Maryland	(1899)	1
Washington University	(1915)	1
Jefferson Medical College	(1910)	1
University of Pennsylvania	(1897) (1909) (1915)	3
Woman's Medical College of Pennsylvania	(1909)	1
Tohoku Imperial University	(1901)	1

Nevada May Report

Dr. Simeon L. Lee, secretary of the Nevada State Board of Medical Examiners, reports the written examination held at Carson City, May 1-3, 1916. The total number of subjects examined in was 13; total number of questions asked, 100; percentage required to pass, 75. The total number of candidates examined was 5, of whom 4 passed and 1 failed. Eight candidates were licensed through reciprocity. The following colleges were represented:

PASSED

College	Year Grad.	Per Cent.
Harvard University	(1901)	88.9
Cornell University	(1910)	95.9
New York University Medical College	(1898)	91.6
Tokyo Charity Hospital, Special Medical School	(1911)	81.9

FAILED

College of Physicians and Surgeons, Little Rock	(1909)	41.6

LICENSED THROUGH RECIPROCITY

College	Year Grad.	Reciprocity with
Georgetown University	(1891)	Penna.
College of Physicians and Surgeons, Chicago	(1897)	Wisconsin
Jenner Medical College	(1901) Illinois; (1904)	Indiana
Rush Medical College	(1896)	Nebraska
Detroit College of Medicine	(1901)	Illinois
John A. Creighton Medical College	(1896)	Nebraska
Montreal School of Medicine and Surgery	(1895)	Indiana

Medicolegal

Insufficient Evidence of Malpractice — Requirements

(Adolay vs. Miller et al. (Ind.), 111 N. E. R. 313)

The Appellate Court of Indiana, Division No. 2, affirms a judgment in favor of the defendants, who were charged with malpractice in the treatment of a compound fracture of the bones of the plaintiff's right forearm. The court says that, to its mind, the evidence showed nothing more than the acts of the defendants while engaged in setting the injured bones as these were observed by the plaintiff and his wife, the nature of the treatment by Dr. Miller thereafter as they observed it, the statement of the defendants as to their belief that the arm would be restored to its usefulness, and the fact that the arm was not straight when the splints were removed. There was no evidence from any physician who had given the jury any standard by which the fact in dispute could be properly determined, and, since the jury was not permitted to draw the conclusion of unskilfulness from the result of the operation of treatment, it seems to the court that to permit the jury to determine the case without some competent evidence as a standard from which it might be determined whether the services rendered by the defendants were done with reasonable care and skilfulness would be to permit a determination of that question from mere speculation and conjecture. When a physician and surgeon assumes to treat and care for a patient, in the absence of a special agreement, he is held in law to have impliedly contracted that he possesses the reasonable and ordinary qualifications of his profession, and that he will exercise at least reasonable skill, diligence and care in his treatment of him. This implied contract on the part of the physician does not include a promise to effect a cure, and negligence cannot be imputed because a cure is not effected; but he does impliedly promise that he will use due diligence and ordinary skill in his treatment of the patient so that a cure may follow such care and skill, and this degree of care and skill is required of him, not only in performing an operation, or administering first treatments, but he is held to the like degree of care and skill in the necessary subsequent treatments, unless he is excused from further service by the patient himself, or the physician or surgeon on due notice refuses to further treat the case. In determining whether the physician or surgeon has exercised the degree of care and skill which the law requires, regard must be had to the advanced state of the profession at the time of treatment and in the locality in which the physician or surgeon practices. But where a physician or surgeon is employed as a specialist on account of his peculiar learning and skill, he is bound to bring to the discharge of his duty to patients employing him, as such specialist, that degree of skill and knowledge which is ordinarily possessed by physicians who devote special attention and study to the disease, its diagnosis and treatment, having regard to the present state of scientific knowledge. In either case the legal duty of the general practitioner of medicine and surgery and the legal duty of the specialist must be measured by some legal standard. It must be tested by some competent evidence so that the jury may have before it a proper standard by which it may determine whether the acts or the omissions of the physician or surgeon constitute a neglect or omission of duty.

Sufficient Information; Title to Act; Evidence of Practicing Medicine

(State vs. Erickson (Utah), 154 Pac. R. 948)

The Supreme Court of Utah affirms a judgment of conviction of the defendant, a chiropractor, of practicing medicine without a license. The court says that the information was that he did "wilfully and unlawfully," on a day and at a place specified, "practice medicine without holding a lawful certificate or license issued by the state board of medical examiners of the state of Utah, by then and there diagnosing, treating, operating upon, and adjusting for the physical ailments of one Thomas E. Browning for a fee of

$2, then and there paid by the said Thomas E. Browning to, and received by," the defendant. It was contended that the information was insufficient because it did not contain a sufficient statement of the acts constituting the offense, or the particular circumstances necessary to a complete offense. But the offense was stated in the language of the statute defining the practice of medicine, and where the statute defines the offense by the use of words which have a well recognized meaning, and designates the particular acts or means whereby the offense may be committed, to charge the offense substantially in the language of the statute is sufficient. Had the statute but declared that any person "practicing medicine" without a license or certificate was guilty of an offense, then it might well be argued that an information stating the offense must, to be good, be expanded beyond the language of the statute.

The court does not agree with the contention that the statute itself is unconstitutional because the subject is not clearly expressed in its title. The title is "An act for the regulation of the practice of medicine and surgery in the state of Utah, and for the appointment of a board of medical examiners in the matter of such regulation and providing for the repeal of" certain named sections of the Revised Statutes of 1898, and as stated in Chapter 93, laws of 1911, "An act amending" a number of specified sections "C. L. 1907, for the regulation of the practice of medicine and surgery." Under that, the court thinks enactments defining the practice of medicine, prescribing the qualifications to practice, requiring a license to practice and making it unlawful to practice without one, and creating a board of medical examiners and prescribing its duties and powers are all within, and germane to, the title.

Did the defendant practice medicine within the meaning of the statute? He, as a chiropractor, maintained an office. Browning, the person named in the information, having sprained his foot or ankle, called on him at his office. He examined the ankle and foot, which were in "a swollen and black and blue condition." He had Browning strip to the waist and lie on a table, and then began to manipulate his spine. When "he came to a particular spot, he gave it a hard press, and then a little farther down gave another." He continued that operation for a considerable time and then operated a vibrator up and down the back. He explained to the patient that the trouble was in the nerve centers of the third lumbar vertebra, and that the forces had been shut off, and that there was not sufficient nerve energy to heal the leg, and that he would have to readjust that particular lumbar and get it in its proper place, and that then there would be a sufficient flow of nerve energy to heal up the leg. He also advised Browning on retiring to wrap a towel saturated with strong salt brine around the foot. He gave him but one treatment or adjustment, for which Browning paid him $2. The court thinks the evidence justified a finding that the defendant practiced medicine within the meaning of the statute: that he, for a fee, diagnosed, treated and operated on a physical or abnormal ailment or condition of another.

Gross Unprofessional Conduct Justifying Revocation of License

(Senior vs. State Board of Health (R. I.), 99 Atl. R. 340)

The Supreme Court of Rhode Island affirms a finding of the state board of health that defendant Senior had been guilty of gross unprofessional conduct in violation of Section 5 of Chapter 193 of the General Laws of Rhode Island of 1909, and that in consequence the certificate issued by the board authorizing him to practice medicine and surgery in the state should be revoked. From the action of the board he appealed to this court. The charges preferred by the secretary of the board were that the defendant had been guilty of gross unprofessional conduct; that he had violated the laws of the state, and that he had been guilty of acts which rendered him an unsuitable person to practice medicine. On the hearing before the court, testimony was presented showing that he had been frequently guilty of drunkenness and of improper and indecent acts in public places; that in the year 1913 he had been twice convicted and sentenced as a common drunkard; that in October, 1915, he had been consulted by several persons to obtain the performance by him of illegal acts, and had named to them the price for which he would perform such acts. The court says that the charges were sustained by the evidence, wherefore the finding of the board is affirmed and the license of the defendant to practice medicine and surgery in Rhode Island is revoked.

Society Proceedings

COMING MEETINGS

Colorado State Medical Society, Glenwood Springs, Sept. 5-7.
Michigan State Medical Society, Houghton, Aug. 15-17.
Oregon State Medical Association, Portland, Sept. 9-10.
Utah State Medical Association, Salt Lake City, Sept. 12-13.

NEW YORK ACADEMY OF MEDICINE

Special Meeting, held July 13, 1916

The President, Dr. Walter B. James, in the Chair

SYMPOSIUM ON INFANTILE PARALYSIS

What We Know About the Transmission of the Disease

Dr. Simon Flexner read a paper entitled "The Nature, Manner of Conveyance and Means of Prevention of Infantile Paralysis," which appears in The Journal, this issue, p. 279.

The Clinical Types of the Disease

Dr. Henry Koplik: Poliomyelitis is primarily an epidemic disease, and as a sporadic condition it has attracted very little notice. All the epidemics which have thus far been recorded resemble each other very closely. An attempt to connect this disease with the occurrence of cerebrospinal meningitis has developed into a belief that poliomyelitis is an entity, clinically occurring in epidemics in the late spring to late autumn and following the regular sporadic occurrence of the disease in limited numbers in the months following the winter and reaching into the late spring up to the time of the epidemic outbreaks. Epidemics of this disease have been known to skip a year and always to crop up in the place of its original occurrence, which should give the thoughtful a hint as to its possible cause and epidemiology. In all the epidemics thus far recorded, the symptomatology and clinical types have been much the same. Though most of the scientific knowledge of the clinical types of poliomyelitis is borrowed from Swedish and Norwegian observers, Medin and Wickman, the first inkling of the epidemic nature of the disease was voiced by Colmer, an American physician, who in 1841 observed some form of paralysis in a child and obtained the history that in the locality in which the patient lived several similar cases had occurred and most of the patients had recovered. Following him, Caverly in 1894 described an epidemic in Vermont; Taylor and Chapin later on observed the epidemic nature of the disease. Aside from these observers, much of the clinical knowledge at present was due to Medin, who described the clinical types of acute epidemic poliomyelitis in 1884 before the International Congress, much to the astonishment of most pediatricians, who still retained the simple picture as retained in older textbooks, of poliomyelitis anterior as a simple, infantile paralysis. In all, forty-two epidemics have been observed in America and on the continent, and this alone should establish the tendency of poliomyelitis to occur in epidemic form at certain seasons and remain sporadic until the time arrives for a new outbreak. The disease selects the young as its victims. Out of 886 cases in the epidemic of 1907, 571 patients were below 3 years of age, 771 below 5 years and three were under 6 months of age. In the present epidemic, the youngest patient I have seen was 4½ months old and absolutely breast fed. The most susceptible period was from 1 to 3 years of age.

It is through the abortive type of the disease that these cases are spread to others. In this type the disease does not

go on to paralysis, the patient recovers, and the disease does not leave the host injured as to the muscular motor apparatus. This type can be recognized so as to leave no doubt as to its distinct identity. A child of 5 years is attacked with a headache, slight malaise and an attack of vomiting lasting five days, intense pain in both lower extremities radiating to the soles of the feet and worse at night, slight pain in the nape of the neck, lassitude, cerebellar gait on walking, increased reflexes in the lower extremities, and rectal temperature above 100.5 F. In ten days the pains have disappeared, the child is well and wants to go out and play. The abortive cases present prodromes such as headache, weakness, diminished reflexes and pain in the nape of the neck, with or without vomiting and fever, still do not present paralysis, and the patient recovers.

The spinal or bulbospinal type is the most common, and gives the disease its name. The patient has an attack of vomiting and slight fever, and within twenty-four hours the mother observes that the child cannot move one or the other extremitiy. In these forms there may be no fever, but it is possible that in giving the history the mother may have overlooked the symptoms of fever, malaise and such indisposition as peevishness, which may have preceded by a few days the paralysis. In other cases, the paralysis appears gradually. Pain may continue to be quite severe, especially when the extremities are moved. The paralysis may spread and involve not only the remaining lower extremity, but also the upper extremities, the muscles of the back and respiratory muscles of the thorax, and possibly the muscles of the abdomen. As a rule, in the purely spinal cases, the paralysis appears and does not spread in the great number of cases. In others, it may spread from the extremities and involve the whole trunk, even to causing bulbar paralysis of the respiratory centers. But after the tenth day, paralysis is not apt to spread to the bulbar medulla, though patients have been known to die after the fifteenth day. Both the meningitis and cerebral types should be combined because of the cerebral symptoms, which give rise to a picture closely simulating meningitis. The meningitic form of poliomyelitis runs its course with cerebral symptoms. A child of 3 is taken with vomiting for forty-eight hours, followed by rigidity of the neck with pain on flexion of the head, Brudzinski's sign and reflex, Kernig's sign, sopor and Macewen's sign, which may be slightly marked, and also diminished knee reflexes. Some patients may improve after a day or two, the fever may abate, and they may even be about and then have a recrudescence of fever, sopor, rigidity, delirium, irritability, extreme hyperesthesia and pain in the nape of the neck. In some cases the only palsy may be ocular; in others a slight facial palsy may be present which may be combined with a weakness in one or other extremity. After a week, the patient becomes brighter. There is still, however, marked ataxia and Romberg's sign. As convalescence is established, the ataxia is the last symptom to disappear. The hydrocephalus and abnormal mental state may remain for some time after the temperature is normal. On recovery, there are a slight strabismus, ataxia, and optic neuritis. In one group of cases I saw unilateral ophthalmoplegia with hemorrhages into the retina. In lumbar puncture lies the differentiation in the form of poliomyelitis from cerebrospinal meningitis. The bulbar or pontine form of the disease deserves notice as a distinct form. An infant, breast fed, 13 months of age, is attacked with fever and vomiting. The fever continues into the afternoon of the following day. The temperature continues at 102.4, the infant is bright, laughs and plays in the crib, but there is a tired look about the face and eyes. The knee reflexes are increased; otherwise there is no paralysis that can be demonstrated. In one case, ten days before the patient, aged 21 months, was seen, he was taken with high fever and vomiting, and there were some green movements. The fever continued, in a less degree, to the ninth day, when the mother noticed that the right side of the face was flat, there were tremulous movements of the head and arms, and the patient was restless. There was constant jactitation of the head, insomnia, and rigidity of the neck, but no palsies of the extremities; on the contrary, the patient exhibited great strength in both upper and lower extremities. In other cases, the outcome was not so favorable; there was an involvement of the nuclei which control deglutition and respiration. In these cases the patient may be lost by paralysis of the respiratory centers. The neuritic type included those cases in which pains in the extremities became a leading feature of the clinical picture. Some of these patients developed paralysis; others did not. They were referred to under the head of abortive cases. The symptoms given justify a lumbar puncture in order to establish the character of the fluid, which in poliomyelitis shows a lymphocytic cytology and an increase of globulin. The examination of the blood was very uncertain. As to prognosis, the low mortality of 10 per cent. applied to children below 11 years of age, and 27 per cent. among older children and adults. Twenty per cent. of all patients completely recover, and the younger the child the better the prognosis.

Abortive and Nonparalytic Cases, Their Importance and Their Recognition

DR. GEORGE DRAPER: Cases are designated as abortive when attention is centered on the paralysis as the chief symptom of poliomyelitis; but as our knowledge has grown it has become increasingly evident that in dealing with acute anterior poliomyelitis we are dealing with a general infection that presents a great variety of manifestations. The cases that escape paralysis are just as important from the standpoint of the spread of the infection as the paralyzed cases, and infinitely more dangerous. The cases that have hitherto been called abortive should be called atypical if we consider those that develop paralyses as typical. Unfortunately there is no possible way at the present time of determining the number of cases that are not paralyzed. The figures vary greatly and undoubtedly the number of cases that are not paralyzed varies greatly in different epidemics. There are certain indications, however, that lead us to believe that the number of cases of this group is considerable. It has been said that it is extremely rare to see more than one case of poliomyelitis in a family, but a very careful investigation where there has been one case in a family frequently shows that another child has had mild symptoms, as fever, general malaise and vomiting. Furthermore, pathologic studies show not only that there may be lesions in the spinal cord, but also that the viscera and the entire lymphatic apparatus may be involved and we may find palpably enlarged lymph nodes. This is evidence that we are dealing with a general infectious disease.

In general all cases fall into the following groups: 1. Gastro-intestinal. 2. Respiratory. In these we may have the symptoms of influenza, cough, lung signs and pains in the bones and joints. 3. Febrile. 4. A type characterized by symptoms of meningismus. 5. The type in which paralysis occurs. In the first three types we may have slight transient paralyses. In the type showing paralysis we may have as prodromal symptoms any or all of the prodromal symptoms of the other types. The intensity of the symptoms is no guide to the prognosis. In this connection it is of interest to note that in fatal cases more extensive lesions of the cord have sometimes been found than were indicated by the symptoms. That there should have been this general degeneration of cord without manifestations suggests that we may have lesions that do not give clinical evidence of their existence. In times of epidemic every one is alive to these symptoms, but it is not enough that the physician should say this is or is not a case of poliomyelitis. In suspicious cases lumbar puncture should be made and the spinal fluid examined.

The diagnosis is based, therefore, on gastro-intestinal, respiratory and febrile symptoms. Where we find the latter, a search should be made for transient weakness and mild degrees of paralysis and for local muscle tenderness. One point of value in diagnosis is the anterior spinal flexion sign. It is a very striking thing that before paralysis sets in the spinal flexion sign is definitely present, and this is probably responsible for the stiff neck and Kernig's sign. The sign is elicited by having the child place his hands under his thighs and then flexing his trunk forward, doubling him up.

The Present Epidemic—The Types Which it Represents

Dr. Louis C. Ager: From June 20 to July 12, we cared for 320 patients with poliomyelitis in the Kingston Avenue Hospital. The resident staff was thus brought face to face with a large number of serious problems and a large amount of work to be accomplished. July 3, eighty-nine patients were admitted to the hospital. The most striking feature in connection with this work was the change observed in many of these children as the result of the facilities offered for making them comfortable in the hospital. Something has been done in the study of the infectivity of the disease, but the degree of infectivity has not yet been decided. There must be a large number of cases of the abortive type that are not recognized. In the Kingston Avenue Hospital we have at least eight series of cases in which there have been two or more cases in the same family. A great many more instances of this kind would have been found if we had had more complete statistics in 1907. That there are practically no cases among the colored race is borne out by our experience; there has been no colored child admitted with poliomyelitis. Some investigators have tried to find a relationship in the incidence of the disease in complected people, but no such relationship has been traced. The incidence of the disease is likewise practically the same in all nationalities. Another point that has been brought up is in reference to the affections of the liver and spleen. We have not found anything in this respect so far as the clinical signs are concerned; there is no material enlargement of these organs, except in some fulminating cases. This is a systemic infection, and, like tuberculosis in small infants, may involve the entire system. We found only two cases of enlarged liver in sixty-seven cases. The age incidence in the present epidemic is practically the same as in the epidemic of 1907. It is a peculiar fact that in epidemics in this country the age incidence is lower than in those on the other side. Among eighty-seven cases observed rather closely, forty-six occurred between the ages of 2 and 5 years; twenty-two between the ages of 1 and 2 years; eight between the ages of 6 and 12, and three between 1 and 6 months. They had two adult cases in this group, one in a woman 28 years of age and one in a pregnant woman of 21 years. As to the type of the disease in our clinical work, we have distinguished three types, the encephalitic, the poliomyelitic and the meningitic. Perhaps this classification is not scientific, but we have found it valuable for bedside work. We found as usual that the lower extremities were most frequently paralyzed. In a group of sixty-four cases examined, the lower extremities were involved in thirty-nine instances; in seven instances the upper extremities; in five there was facial paralysis; in thirteen cases the only definite symptoms were marked paralysis of the muscles of the back. There were two typical ataxic cases. The only place to take care of children with poliomyelitis is in a hospital, unless the conditions of the hospital can be exactly reproduced in the home.

Laboratory Aids in the Diagnosis of Poliomyelitis

Dr. Josephine B. Neal: It is well known that sporadic cases of poliomyelitis are frequently seen when no epidemic exists. Because of this fact, during the past six years, it has been the lot of the Meningitis Division of the Department of Health to study both clinically, and by means of laboratory methods, many of the cases before the present epidemic occurred. Most of the cases seen by us, both before and during this epidemic, have been atypical, and we have, therefore, been compelled, when endeavoring to make a diagnosis, to consider our laboratory findings with more than ordinary care. Perhaps one of the most interesting experiments employed in the study of poliomyelitis has been the inoculation of monkeys by means of washings from the respiratory mucous membrane. This was first successfully performed by Kling, Petterson and Wernstedt in 1911. Working with Dr. Du Bois and Dr. Zingher we obtained washings from the nose and throat in an abortive case two weeks after the incidence of the sickness. With these we produced typical poliomyelitis in monkeys. In sections of the brain, from one of these monkeys, a few globoid bodies similar to those described by Flexner and Noguchi were found. A report of this work appeared in The Journal, Jan. 3, 1914. Another laboratory method of some diagnostic value is the so-called neutralization test. In this, serum from the suspected individual in the stage of recovery is mixed with an old fatal dose of an active virus. These are incubated and later injected intracerebrally into monkeys. Failure of the disease to develop indicates that the virus has been neutralized. This test, however, does not furnish conclusive evidence of poliomyelitis, for serums from noses known to have been free from a recent attack of the disease have sometimes successfully neutralized the virus. It is, however, quite obvious that laboratory methods requiring the use of monkeys are both too complicated and too expensive for ordinary diagnostic use. A study of the blood picture was exhaustively made by Peabody, Draper and Dochez of the Rockefeller Institute. It was shown that there existed a varying increase in leukocytes and a polymorphonucleosis. This is characteristic of so many other diseases that it is of little help in diagnosis.

The procedure which we find to be our most reliable and valuable aid in the recognition of poliomyelitis is the examination of the spinal fluid. In the first twenty-four to forty-eight hours after its onset, poliomyelitis must be differentiated from the early stages of epidemic meningitis or mild purulent meningitis and also from a meningism accompanying pneumonia or other infection. The clinical pictures presented by the above mentioned diseases are quite similar, and it is in the distinguishing between them that the examination of the spinal fluid affords us the most reliable information. In the early stages of poliomyelitis, the spinal fluid is clear, or rarely, it may be slightly cloudy. It often shows a good fibrin web formation. There is a slight or moderate increase of albumin and globulin and also of the cellular elements. The reduction of Fehling's solution is prompt. Those poliomyelitic fluids which are cloudy present a polymorphonucleosis which may run as high as 90 per cent. but which we usually find to be about 60 per cent. As a rule, however, 80 per cent. or more of the cells are mononuclears. In examining such fluids we have frequently observed the presence of large mononuclear cells which we believe to be in a measure characteristic of poliomyelitis. We are now studying these by means of the various differential stains in the hope that our research in this direction may develop something of positive diagnostic significance.

Two rare types of spinal fluids sometimes occur in poliomyelitis when the hemorrhagic process has been more than usually extensive. The first of these is of the true hemorrhagic character, the red blood cells being evenly diffused throughout the field. When collected in successive tubes, the specimens are all hemorrhagic, showing no change in the intensity of the hemorrhage. This serves to differentiate it from bloody fluids obtained by the accidental puncture of a vein. The second of these rare fluids illustrates the so-called syndrome of Froin. It has a characteristic yellow color and coagulates spontaneously. The spinal fluid in early cases of purulent meningitis shows a varying degree of cloudiness, except in very rare instances when it may be clear. A greater increase in albumin and globulin is usually found here than occurs in poliomyelitis with a poorer reduction of Fehling's solution. The cells in these fluids of purulent meningitis are 90 per cent. or more polymorphonuclears, and the etiologic organism is found except in the mildest cases. In certain mild cases of meningitis probably of epidemic variety the meningococci may never be positively demonstrated in the fluid. In purulent meningitis due to other organisms, these practically always appear later. In one instance I have seen a clear fluid from an early case of epidemic meningitis. This was of about eighteen hours' standing. Although the cellular reaction was so slight, the meningococcus is demonstrated to be present in the fluid by smear and culture. The fluid in meningism is increased in amount but practically normal in character. When seen a week or more after the onset, cases of poliomyelitis, especially if presenting cerebral symptoms, must be differentiated from tuberculous meningitis. The spinal fluid in both these conditions is clear and

increased in amount. The albumin and globulin content of both is also increased, but usually in poliomyelitis the increase of both these last named elements is not so great as occurs in tuberculous meningitis. The reduction of Fehling's solution is usually better. The cellular element is also usually less in poliomyelitis. In both conditions at this stage there is ordinarily a mononucleosis, although in some acute cases of tuberculous meningitis there is a polymorphonucleosis. If, however, as may happen occasionally, the increase of albumin and globulin is greater than usual and the reduction of Fehling's solution is not so prompt, then the determination of the disease must wait on the results of animal inoculation if it has been impossible to demonstrate tubercle bacilli in fluids. (A detailed study of the spinal fluids of poliomyelitis examined at the research laboratory was made by Dr. H. L. Abrahamson of the meningitis division, and published in the *American Journal of Diseases of Children*, November, 1915.) In brief, then, a spinal fluid increased in amount and showing a slight to moderate increase in albumin and globulin, a good reduction of Fehling's solution and a varying cellular increase, mostly mononuclear, makes the diagnosis reasonably certain in fairly early cases of suspected poliomyelitis. A slightly cloudy fluid occurring very early in the disease must be differentiated, as noted above, from a similar fluid in an early purulent meningitis. Fluids from the cerebral or encephalitic type of poliomyelitis sometimes may be differentiated from fluids of tuberculous meningitis only by animal inoculation.

The Importance of the Present Epidemic

DR. HAVEN EMERSON: During the month of May only five cases were reported. Fifteen more that had their onset in May were not reported until in July. In June there was a rapidly rising incidence of the disease, beginning about June 20, and increasing, until the highest point was reached about July 11. Since that time there has appeared to be a recession, but we cannot as yet say that it is permanent. A study of the death rates of diphtheria, scarlet fever, measles and diarrheal diseases in this city during the past six years and during the first six months of this year show that the incidence and mortality from poliomyelitis is small by comparison. During the first six months of 1916 there were 884 deaths from diarrheal disease, and fifty-seven from poliomyelitis. One of the chief points of interest in connection with the epidemic is the psychologic state of the lay public. The reason for the present panic on the part of the public is probably because this is the first epidemic of poliomyelitis in this city in which the disease has been made reportable, and also the first in which there has been an effort at hospitalization. We must acknowledge that our present method of dealing with the disease is an experiment. At the onset of the epidemic the health department was confronted by two alternatives. The one was to avoid publicity and to see what could be done by the medical control of cases. The other was a campaign of publicity which offered the better prospect of the real control of the disease. The latter method also offered the opportunity of giving the public a practical lesson in cleanliness and the control of infectious disease. Consequently we decided on our present campaign of publicity and hospitalization. In 1907, it was not until November, when the epidemic was drawing to a close, that any organized attempt was made to study it. This is the first epidemic in this city in which a study has been made at the time the patients were coming down with the disease. It is estimated that in the epidemic of 1907 there were 2,500 cases, and that the mortality was about 5 per cent. In a group of 700 cases accurately studied, the mortality was found to be 27 per cent. The average mortality as estimated in foreign epidemics has been from 7 to 10 per cent. During the present epidemic the mortality thus far has been 18.7 per cent. The most important factors in dealing with infantile paralysis are early diagnosis and the placing of all patients under neurologic and orthopedic observation. This may save the individual and the public from the future burden that permanent crippling of the victims of infantile paralysis implies. The early recognition of the condition is the most important factor in preventing the spread of the virus among the healthy. Poliomyelitis is essentially a disease of early childhood. At least 99 per cent. of the children affected in this epidemic have been born since the last epidemic.

Of about 1,600 patients with poliomyelitis who have come under the observation of the Health Department during the present epidemic, 917 have been under 5 years of age and 14 per cent. have been between 5 and 10 years. It may be said that about 99 per cent. of the patients have been under 10 years of age. Four hundred and three cases have shown paralysis. In about 50 per cent. of these the paralysis made its appearance in the course of a few days after the onset of the disease. The longest period after the onset of the disease at which paralysis made its appearance was sixteen days. In between 5 and 8 per cent. of the cases there have been secondary or subsequent cases in the same family. When we get a second or third case in the course of three or four days after the onset of the first case it is safe to classify it as a secondary case.

These facts are important since the public has not been impressed previously by the infectious nature of the disease. Our position in dealing with suspected carriers is rather difficult, since we are unable to detect carriers as can be done in diphtheria and typhoid fever. It has thus been a question whether one had a right to interfere with a supposed carrier. This epidemic has given us the opportunity to make use of the concerted action of the hospitals of the city. The present action will probably result in some plan for cooperation that can be used in times of emergency in the future, which will be a great benefit to the public and will favor the scientific study of disease. Our experience with infantile paralysis has taught us the necessity of having a staff suited to the needs of these patients. Such a staff should include a laboratory diagnostician, a neurologist, an orthopedist and a pediatrician. I would urge hospitals that are likely to be called on to care for these cases to organize a staff of this type. The after-care of patients with poliomyelitis offers a great opportunity for the use of social service organization. There is need of concentrated follow-up home work in all of the cases. This is a need which will continue for years after the patients have left the hospital. A large number of hospitals in the city are taking cases of poliomyelitis and many have signified their willingness to do so. The quarantine service has been cooperating with the department of health, and Ellis Island has offered accommodations for patients if they shall be needed. This cooperation among hospitals is a notable contribution to our progress.

In our work it has been most discouraging to meet with the unrecognized and neglected cases of infantile paralysis. We meet instances in which slight illness followed by slight limp have been disregarded by the mother. These patients may suffer permanent injury because of neglect, and are a fruitful source of infection. I wish to call your attention to the degree to which the medical profession will sacrifice itself for the public welfare. Many instances have come to my attention in which physicians have for the time being lost their practice because they have been taking care of cases of infantile paralysis, their patients being afraid to come to their offices. I hope that wherever you see this attitude on the part of patients you will do all you can to discourage it and to see that other physicians do not suffer because of their willingness to sacrifice themselves for the public good. No health department can control an epidemic and secure proper police enforcement of its regulations without the cooperation of the medical profession, so we appeal to you to give us your support through the early diagnosis and prompt report of all cases of this disease coming under your observation.

Discussion on Infantile Paralysis

DR. WILLIAM H. PARK: The sick person and the carrier are the chief sources of infection. There is no evidence that a fly or insect transmits the disease, though they may carry the disease. We must then guard against the spread of the disease by the sick person, the carrier and filth that has

been contaminated with the virus. If we find that an insect is a carrier it will probably be in a subordinate degree. It will be very difficult to prove that an animal that has been inoculated is a carrier of the infection. Even if we could detect the carrier of poliomyelitis as we do those of diphtheria, pneumonia or scarlet fever, I doubt if we would act very differently than we are now doing. We have the knowledge by which we may detect the carriers of diphtheria and pneumonia, and yet we have done little in this direction to prevent these diseases. It is not in lack of knowledge that the difficulty of controlling the carrier lies. In the light of what has been done in other diseases by the use of vaccines or serums it is possible that we may learn to do more in poliomyelitis; but at present we have no practical knowledge that we can offer.

DR. WALTER B. JAMES: Two questions have been asked. Some one asks whether it is a safe plan to admit cases of poliomyelitis to a general hospital. A physician from the midst of the infected district asks what the modern treatment of poliomyelitis is.

DR. HAVEN EMERSON: We regard it as perfectly safe to admit patients with poliomyelitis into general hospitals. The disease is rarely communicated in general hospitals to other persons.

DR. HENRY KOPLIK: The treatment of the disease at this time can be only symptomatic. The patient should be isolated and kept absolutely quiet. Any one in attendance on a case of poliomyelitis should wear a gown and should cleanse his hands on leaving the patient. A German physician in Munich has recommended that the patient be placed in a Bradford frame so that he may be kept absolutely quiet. In addition to perfect quiet, the patient should have plenty of fresh air and an easily assimilable diet. The bowels should be kept open. There is no particular remedy except those supposed to have an effect on the general nervous system. Liberal doses of hexamethylenamin have been employed, but its utility has not been definitely established. Lumbar puncture seems to offer certain advantages. In the first place the removal of a certain amount of spinal fluid which is toxic may be of some benefit. Lumbar puncture gives an opportunity to make a diagnosis; it removes pressure, which is an advantage. It is because of this pressure that we get Macewen's sign. When paralysis begins, it is a relief to the patient to keep his limbs absolutely quiet. In some cases a cast may be applied to prevent contractures. We can sometimes see when the cast is removed that it has overcome contracture. The contracture may recur later, and then the patient should be referred to an orthopedist. For the symptoms referable to the nervous system, anodynes, as chloral and the bromids, may be administered. Opium should not be used unless it is absolutely necessary. Charcot has advocated the intramuscular injection of strychnin as soon as the pain and fever have ceased. One-fortieth grain daily may be given over a period of thirty days, selecting different groups of muscles for the injections. Many patients regain their power without these injections, and many do not, so that it is very difficult to give an accurate judgment as to their utility. Warm baths may sometimes prove a great blessing, if they can be given without moving the patient too much. Massage in some instances seems to aggravate the condition; in others it seems to relieve the pain. In some little patients potassium iodid in large doses seems to have an anodyne effect. In a few instances its action has been almost miraculous. The great variety of nostrums that have been exploited as suitable for use in infantile paralysis should be avoided. There should not be too much activity in the treatment of these patients. No attempt should be made to increase the tonicity of the muscles until the active stage of the disease has passed.

DR. LEON LOURIA: An epidemic can be stopped only by an early recognition of those cases that do not show any paralysis. We must revise our medical nomenclature so that we include and treat under the term "poliomyelitis" cases that do not show paralysis. In a few cases I have noticed a very interesting occurrence. A child would be taken ill with an indefinite febrile manifestation and sore throat. He would be treated with the ordinary remedies employed in slight illnesses of this kind and would apparently recover. In three or four days there would be a recurrence when the definite symptoms of poliomyelitis would appear and a definite paralysis would show itself. If these cases are recognized early and the nervous system given the rest it requires, the additional trauma consequent on continued activity will be prevented and the virus may not exert so great an effect. The same treatment should apply to the abortive type of the disease as is given to the paralytic form.

DR. SAMUEL J. MELTZER: The papers presented have failed to cover one essential phase, and that is the treatment of the disease. The reason for it is to be found, perhaps, in the discouraging fact that there is at present practically no treatment for poliomyelitis. I wish to bring forward three promising therapeutic measures based essentially on personal work:

Any inflammatory focus is surrounded at the periphery by zones of hyperemia, exudation and edema. Thirteen years ago, in experimenting on rabbits' ears, we found that an injection of epinephrin reduces an entire inflammatory swelling to a very small focus in the center. The peripheral zones of edema and active hyperemia disappear completely for some time. Several years ago Dr. Auer and I found further that an intraspinal injection of epinephrin into monkeys produces a long lasting effect on the blood pressure, longer than by any other method of administration; more than one hour may pass before the blood pressure returns to normal. On the basis of these observations and on the further plausible assumption that the early stages of the paralytic effects in poliomyelitis are not caused by the chief inflammatory focus but by the peripheral zones of active hyperemia, exudation and edema, I induced Dr. Clark, then working under Dr. Flexner at the Rockefeller Institute, to make the following experiments: Monkeys dying from experimental poliomyelitis received intraspinal injections of epinephrin. The beneficial effect was most striking. Animals which were paralyzed and moribund at the time of the injection were seen several hours later eating bananas which they held themselves. The paralytic conditions were strikingly improved and the life of the animals was prolonged in some cases for several days. The animals finally died; but in this series of Dr. Clark's experiments, all animals received *reliably fatal* doses of the virus. It is important to bear in mind that the mortality in human infantile paralysis is generally not more than 25 per cent. No death is usually due to respiratory paralysis. It is highly probable that in many instances the respiratory paralysis is not produced by the chief inflammatory focus, but by the extensive peripheral zones of exudation and edema, which are surely capable of interfering with the vitality of the nerve centers controlling the respiratory mechanism. If the exudation and edema could be removed for some time, the lives of a few or of many patients may be saved, namely, if in these cases it just happens that the ascending progress of the actual inflammation came to a standstill. On the basis of these facts and considerations I recommend to inject epinephrin intraspinally in every case of infantile paralysis, the injection to be repeated from four to six hours. The procedure may save life, and in surviving cases it may reduce the extent of the final lesion. There is no danger to this procedure. Monkeys stood well as large a dose as 2 c.c. in a single injection. However, in human infantile paralysis the injections should be begun with a dose of 0.5 c.c. of one to one thousand solution of epinephrin until more is learned about the effects. This dose may be repeated every four to five hours increasing to 1 cubic centimeter in a single dose. When pulmonary edema is present the treatment should be used most cautiously.

The second suggestion is to administer artificial respiration by means of our apparatus for pharyngeal insufflation as soon as the patient shows a degree of unconsciousness and respiratory insufficiency. It is an easy and reliable procedure.

The third suggestion is to administer oxygen under pressure in a respiratory rhythm by an apparatus which I have recently devised and used on human beings in several instances. It abolishes rapid cyanosis and may save life. It may even act specifically on the virus of poliomyelitis.

Current Medical Literature

AMERICAN

Titles marked with an asterisk (*) are abstracted below.

American Journal of Medical Sciences, Philadelphia

July, CLII, No. 1, pp. 1-156

1 What Therapy Means. O. T. Osborne, New Haven, Conn.
2 *Treatment by Splenectomy of Splenomegaly with Anemia Associated with Syphilis. H. Z. Giffin, Rochester, Minn.
3 *Comparative Toxicity of Morphin and Morphin-Narcotin (Narcophin). D. I. Macht, Baltimore.
4 *Multiple Primary Intravascular Hemangio-Endotheliomata of Bone Associated with Symptoms of Multiple Myeloma. D. Symmers and M. Vance, New York.
5 *Distribution of Tetanus Toxin in Body. H. E. Robertson, Minneapolis.
6 Case of Idiopathic Purpura Hemorrhagica. G. R. Minot, Boston.
7 Spinal Fluid Syndromes of Nonne and Froin and Their Diagnostic Significance. F. M. Hanes, Richmond, Va.
8 *Chylothorax; Report of Case. P. Lewin, Chicago.
9 Energy Index of Circulatory System. J. H. Barach, Pittsburgh.
10 *Blood Pressure in Pneumonia. F. Tice, Chicago.
11 Regeneration of Bone. F. D. Smith, Chicago.

2. **Splenectomy in Syphilitic Splenomegaly.**—Three cases of splenomegaly definitely associated with syphilis are reported by Giffin. Briefly, the history of these cases is as follows: I. Marked splenomegaly; severe anemia; no hematemesis; history of syphilitic infection not obtained; Wassermann, total inhibition; antisyphilitic treatment without definite improvement; splenectomy; treponemas in walls of splenic vessels; excellent health one year later. II. Moderate splenomegaly; marked anemia of the secondary type without leukocytosis; liver contained palpable gummas; no hematemesis; negative history of syphilis in both patient and husband; Wassermann test, total inhibition, no improvement of anemia on antisyphilitic treatment; splenectomy; prompt improvement in general health and blood. III. History of syphilitic infection at 21. Three positive Wassermann tests elsewhere during the last two years; Wassermann test negative at the time of examination; moderate splenomegaly; slight anemia; recurrent hematemesis; long continued antisyphilitic treatment attended with only partial relief; splenectomy; one gumma and a few treponemas in spleen; excellent condition three months later.

3. **Toxicity of Morphin and Morphin-Narcotin.**—The comparative toxicity of morphin and narcophin was studied on various animals by Macht: Pigs, fish, terrapins, mice, rats, guinea-pigs, rabbits, pigeons, cats and dogs. It was found that in general the toxicity of narcophin is about the same as the same weight of morphin. Narcophin consists of one-third its weight of morphin meconate and two-thirds its weight of narcotin meconate. Inasmuch as the toxicity of narcotin is very low, the author has here a distinct potentiation of the toxicity of morphin. Macht cautions that it is, therefore, not advisable to administer narcophin clinically in doses larger than those of morphin.

4. **Hemangio-Endotheliomata of Bone.**—Symmers and Vance describe a lesion of the osseous system attended by symptoms indistinguishable from those of the multiple myelomas and associated with histologic features which combine with the clinical characteristics to form an apparently unknown disease. The patient, male, aged 43 years, complained of severe pain in the left gluteal region, extending upward to the tenth dorsal vertebra, but not involving the lower extremities. The pain had grown progressively worse during the thirteen months previous; it was burning in character, continuous in point of time and severest at night. Physical examination disclosed a small, indurated, exceedingly painful mass lying just to the left of the anus, and attached to the tuberosity of the ischium. Roentgenographic examination showed irregularities in the periosteal outlines of the left ischium and signs of infiltration of the adjacent tissues. The corresponding hip joint was intact. In the course of the next two months the patient began to complain of tenderness and pains in the right lumbar region and buttock, in the upper part of the right thigh and in the axillary region of the right side. The manubrium sterni, the upper end of the right humerus, and the upper segment of the occipital bone were similarly affected. In the course of the succeeding five months two tender masses became palpable in the occiput and the movements of the left thigh and right arm grew to be exquisitely painful. Roentgenograms revealed complete absorption of the first rib on the right side and of the left ischium from the symphysis to the acetabulum and infiltration of the soft tissues of the vicinity, together with involvement of the upper end of the right humerus and fracture of the surgical neck. In the course of a few weeks there were signs of widespread destruction of the vertebrae. The urine was twice examined for Bence-Jones protein, with negative results.

The tumor was curetted on several occasions. The unit of the tumor is a thin-walled blood vessel, lined by a single layer of flattened endothelial cells, the lumen distended by red blood corpuscles, the whole embedded in a stroma of poorly cellular fibrillar connective tissue arranged around spicules of bone. Here and there, the lining endothelium may be seen as a uniformly growing circumferential layer from five to twenty cells in depth, and from this point the process of proliferation may be followed through various stages leading to occlusion of the lumen by spindle-shaped tumor cells. In other cases the overgrowth of endothelium commences at the periphery of the vessel as one or more arm-like projections and the lumen is eventually occluded. An extraordinary histologic feature consists in proliferation of the endothelium in such a way as to subdivide the vascular lumen into one or more compartments filled by red cells, obviously representing an attempt to form new vascular channels.

5. **Distribution of Tetanus Toxin in Body.**—In tetanus the path of attack of the toxin in the central nervous system is the axis cylinders of the cerebrospinal nerves. Antitoxin travels in the lymph channels, and hence the passage of toxin cannot be interrupted. Therefore, Robertson says, plans for prevention and treatment should take cognizance of these paths of travel.

8. **Chylothorax.**—Lewin's patient developed lymphosarcoma of the mesentery. Metastasis occurred in the inguinal, axillary and abdominal wall lymph glands and in the thoracic duct. The tumor growing in the duct, or metastases in the mediastinal lymph glands caused obstruction, partial or total, of the duct with consequent transudation of chyle into the pleural cavities.

10. **Blood Pressure in Pneumonia.**—The Gibson rule is as follows: When the arterial pressure, expressed in millimeters of mercury does not fall below the pulse rate, expressed in beats per minute, the fact may be taken as of excellent augury, while the converse is equally true. Of fourteen cases reported by Tice in which the blood pressure was constantly, or in greater part below the pulse rate, 8 complied with the rule, or 57.1 per cent. Seventeen cases in which the blood pressure was constantly, or in greater part, above the pulse rate, 12, or 70.5 per cent., complied with the rule. Of the total of the two groups, 31 cases, 20, or 64.5 per cent., verified the observations of Gibson. A reasonable explanation for four of the five discrepancies in the first group is to be found in the presence of a nephritis in three and a myocarditis and obesity in the fourth. In the second group, of the 6 deviations from the rule, 3 were comparatively young, with soft elastic vessels, in which presumably a relatively lower pressure existed before the onset of the pneumonia, or, at least, were able to withstand a greater depression of the circulation. Excluding the 7 cases in which a reasonable exception existed, of the remaining 24 only 4 failed to comply with the rule. Aside from the prognostic significance, the blood pressure and pulse ratio have been of the greatest assistance and satisfaction as a guide to the administration of cardiac stimulants. In some no stimulation was used, while in others one or two intravenous injections of digitalis were sufficient to reduce the pulse rate, increase the blood pressure, and produce a crossing of the curves.

American Journal of Public Health, Boston

June, VI, No. 6, pp. 533-654

12 Sanitary Districts in Analysis of Municipal Mortality and Morbidity Data. R. E. Chaddock, New York.

13 Social Aspects of Industrial Hygiene. D. B. Armstrong, New York.
14 Rural Sanitation; Definition, Field, Principles, Methods and Costs. W. S. Rankin, Raleigh, N. C.
15 Venereal Disease Control in Oranges. F. J. Osborne, Orange, N. J.
16 Some Observations on Causes of High Bacterial Counts in Market Milk. H. D. Pease, New York.
17 Bacterial Testing vs. Dairy Inspection. C. E. North, New York.
18 Studies on Classification of Colon Typhoid Group. J. B. Thomas and E. A. Sandman, Baltimore.
19 Confirmatory Tests for B. Coli in Routine Water Examinations. W. H. Frost, Cincinnati.
20 Report of Committee on Medical Inspection of Schools. W. H. Peters, Cincinnati.
21 Report of Committee on Venereal Diseases. W. F. Snow, New York.
22 Report of Committee on Refuse Collection and Disposal. S. A. Greeley, R. Hering, W. F. Morse, E. R. Conant and W. T. Knowlton.
23 Present Status of Score Card of Milk Quality. H. A. Harding, Urbana, Ill.

American Journal of Physiology, Baltimore

July, XLI, No. 1, pp. 1-141

24 Comparative Vasomotor Reactions in Branches of Arterial Tree. R. E. L. Gunning, Chicago.
25 *Bone Marrow as Source of Prothrombin. C. K. Drinker and K. R. Drinker, Baltimore.
26 *Experiments with Oil of Chenopodium and Cardiac Stimulants on Isolated Frog Heart. W. Salant and A. E. Livingston, Washington, D. C.
27 *Conditions of Activity in Endocrine Glands. Electric Response as Index of Glandular Action. W. B. Cannon and M. Cattell, Boston.
28 *Id. Secretory Innervation of Thyroid. W. B. Cannon and M. Cattell, Boston.
29 Id. Influence of Suprarenal Secretion on Thyroid. W. B. Cannon and M. Cattell, Boston.
30 *Pancreas Deficiency and Vasomotor Irritability. R. G. Hoskins and R. E. L. Gunning, Chicago.
31 Vasomotor Reactions from Stimulation of Floor of Fourth Ventricle. S. W. Ranson and P. R. Billingsley, Chicago.
32 Nature of Splanchnic Rise in Blood Pressure. R. Burton-Opitz and D. J. Edwards, New York.
33 Depressor Action of Thoracic Sympathetic Nerve and Its Branches. R. Burton-Opitz, New York.
34 Localization of Primary Pacemaker in Turtle's Heart. B. H. Schlomovitz and C. S. Chase, Iowa City, Iowa.
35 Conditions of Physiologic Conduction in Irritable Tissues. Electrolytic Local Action as Basis of Propagation of Excitation Wave. R. S. Little, Worcester, Mass.
36 Cryoscopic Measurement of Osmotic Difference Between Resting and Fatigued Muscle. A. R. Moore, Bryn Mawr, Pa.

25. Bone Marrow as Source of Prothrombin.—Evidence is presented by the Drinkers that fibrinogen is not formed in the bone marrow, but that prothrombin is formed there in large amounts. This prothrombin does not arise either from leukocytes, lymphocytes, myelocytes, nucleated red cells, or from wandering endothelial cells. The megacaryocytes are the probable source of the marrow prothrombin.

26. Effect of Oil of Chenopodium on Frog Heart.—Oil of chenopodium according to Salant and Livingston produces marked depression of the isolated frog heart, the effect increasing with the concentration and successive perfusions. The fresh heart is less sensitive to oil of chenopodium than one which has been perfused for some time. Olive oil added to Ringer's solution causes cardiac stimulation which may become more marked later in the experiment. Oil of chenopodium is less active in the presence of olive oil. Epinephrin and digitalis were found to be antagonistic to oil of chenopodium. Caffein produced slight stimulation when perfused with oil of chenopodium, but in some experiments it aided cardiac depression. It is suggested that the action of oil of chenopodium may be due to disturbance of the lipoids of the heart, and that the antagonistic action of olive oil, digitalis and epinephrin may also be correlated with disturbance of lipoid metabolism in the heart. Oil of chenopodium probably affects the muscular substance in the frog heart.

27. Electric Response as Index to Glandular Action.—Because (1) an electric change accompanies secretion of saliva, even though the blood supply is shut off from the gland, or the flow through the duct is stopped; and because (2) the change is absent when secretion is absent although each of the conditions attendant on secretion—as contraction of blood vessels, relaxation of blood vessels, faster flow of blood, slower flow of blood—may severally be induced, the conclusion is drawn by Cannon and Cattell that the electric change is a manifestation solely of the secretory process. When the action current indicates a maximal activity of the submaxillary gland, excited by sympathetic impulses the electric response can be augmented by chorda impulses and vice versa; sympathetic impulses are ineffective during the height of an adrenin effect and chorda impulses cause no increase while pilocarpin is strongly operative. The direction of the action current from the submaxillary gland may be reversed although the physiologic response to stimulation remains as usual. Reversal is therefore not a sign of a reversed process in the gland.

28. Secretory Innervation of Thyroid.—Evidence is offered by Cannon and Cattell to show that the nonmedullated nerves distributed to thyroid cells belong to the sympathic and not to the cranial division of the autonomic system, that their effects are not indirect through alterations of blood supply, that they are indeed true secretory nerves.

30. Pancreas Deficiency and Vasomotor Irritability.—The observations made by Hoskins and Gunning do not support the theory that the pancreas normally exerts a depressing influence on the sympathetic nervous system.

Archives of Pediatrics, New York

June, XXXIII, No. 6, pp. 401-480

37 Accidents and Diseases of Early Weeks of Life. L. E. LaFétra, New York.
38 Care and Feeding During First Month of Life. G. R. Pisek, New York.
39 *Chloroma; Report of Two Cases. E. W. Gould and L. T. LeWald, New York.
40 Obscure Manifestations of Otitis Media in Infancy and Childhood. J. A. Colliver, Los Angeles.
41 Necessity for Early Diagnosis and Continuous Treatment in Congenital Syphilis. J. S. Read, Brooklyn.

39. Chloroma.—These two cases are said to be the first in which a Röentgen examination was made. There was marked enlargement of the mediastinal lymph nodes with slight displacement of the trachea to the right; a distinct separation of the coronal suture, producing a wedge-shaped gap measuring 1 cm. at the vault. Distinct enlargement of the liver and of the spleen. The medullary portion of the long bones showed a peculiar mottling due to rarefied areas. The periosteum was distinctly raised from the surface of the bone over the greater portion of the shaft. The epiphyseal region showed comparatively little departure from normal, except for changes above noted.

Boston Medical and Surgical Journal

July 6, CLXXV, No. 1, pp. 1-34

42 Leonardo Da Vinci's Scientific Research of Vascular System. (To be continued.) A. C. Klebs, Washington, D. C.
43 *Menace of Syphilis of Today to Family of Tomorrow. J. H. Blaisdell, Boston.
44 Vaginal Hysterectomy for Procidentia; Report of Fifty Cases. P. E. Truesdale, Fall River.
45 General Practitioner's Apologia Pro Vita Sua. A. F. Downing, Cambridge.
46 Anesthesia. E. L. Young, Jr., Boston.
47 Treatment of Paresis by Intraventricular Injections of Diarsenolized Serum, with Presentation of Cases. P. C. Knapp, Boston.

43. Menace of Syphilis of Today to Family of Tomorrow.—In thirty families studied by Blaisdell, 59 out of 62 parents were probably infected. Of 132 possible children, only 23, most of whom were born before their parents' infection, were healthy. Of the remaining 109, syphilis claims through miscarriage, later death, or congenital disease at least 83 pregnancies. Blaisdell says that syphilis will appear in the home of tomorrow in proportion to the inadequacy of treatment among the "men and women of the street" of today.

Bulletin of Johns Hopkins Hospital, Baltimore

July, XXVII, No. 305, pp. 193-220

48 *Chemical Studies on Case of Bichlorid Poisoning. D. S. Lewis and T. M. Rivers, Baltimore.
49 Methods Employed on Second Surgical Division of New York Hospital. F. W. Bancroft, New York.
50 William Budd, Pioneer Epidemiologist. W. C. Rucker, Washington, D. C.

48. **Studies of Bichlorid Poisoning.**—The necessity of prolonged and vigorous treatment of every case of bichlorid poisoning is strongly emphasized by Lewis and Rivers. Many apparently moribund individuals have been saved by properly directed and vigorously pushed therapeutic measures. Death should be the only indication for a discontinuance of treatment prior to the complete recovery of the patient. Retention of waste nitrogen is undoubtedly a factor in the early fatal issue of these cases. There are rarely any signs of uremia. The protein sparing powers of the carbohydrates are of the greatest value in delaying the appearance of the extreme grades of nitrogen retention which usually precede death. If carbohydrate cannot be retained by mouth, glucose may be given intravenously in a 10 to 50 per cent. solution. In addition to its protein sparing action, the glucose itself acts as a mild diuretic. Alkalies have a decidedly beneficial action. Large doses of sodium bicarbonate given intravenously soon after the taking of the poison exert a protective action in bichlorid poisoning. The diuretic action of the alkalies is well known.

Bulletin of Lying-In Hospital of City of New York

July, X, No. 4, pp. 209-262

51 Conservative Obstetrics; Some Lessons Learned in Twenty-Five Years' Service at Philadelphia Lying-In Charity. G. M. Boyd, Philadelphia.
52 *Postmortem Cesarean Section; Report of Ten Cases. J. A. Harrar, New York.
53 Report on Four Cases of Ruptured Pelves. W. A. Morgan, New York.
54 Case of Congenital Atresia of Duodenum. J. R. Losee, New York.
55 Posterior Dislocation of Lower Humeral Epiphysis as Birth Injury. E. D. Truesdell, New York.
56 Syphilis in Mother and Infant. J. R. Losee, New York.

52. **Postmortem Cesarean Section.**—In the cases presented by Harrar the longest interval between the death of the mother and the delivery of a living infant was seven minutes. One delivered after eight minutes gave a few feeble gasps and died shortly after birth. One delivered after an interval of twenty minutes had a feebly beating heart but never made any attempts at respiration. The obvious observation is that the success of the operation depends very much on the promptness with which it is done. Unless there is positive proof that the baby is dead, when the mother succumbs it is justifiable to proceed at once to postmortem cesarean section. Except in operating on the dying woman, asepsis and the time necessary to assure it may be ignored. With any cutting instrument at hand the abdomen and uterus are quickly and freely incised and the child extracted. The uterus has occasionally been observed to contract after the extraction of the child. The second point emphasized is the importance of persisting in prolonged efforts at artificial respiration as long as any intermittent contraction can be appreciated in the baby's heart by pressing the fingers up under the left costal margin. The children are almost invariably born in severe asphyxia and great patience is required in their resuscitation.

Florida Medical Association Journal, Jacksonville

June, II, No. 12, pp. 353-387

57 Medical Profession and Health Conservation. R. H. McGinnis, Jacksonville.
58 Physician as Aid to Industrial Progress. E. W. Warren, Palatka.
59 Indigestion. M. H. Smith, Jacksonville.
60 Creeping Eruption. G. H. Edwards, Orlando.
61 Treatment of Malarial Hemoglobinuria. K. Cross, Crystal River.

Indiana State Medical Association Journal, Fort Wayne

June, IX, No. 6, pp. 223-276

62 Small Cysts of Ovary. J. A. Work, Jr., Elkhart.
63 *Tonsil. M. Ravdin, Evansville.
64 *Chronic Suppurative Ethmoiditis. W. S. Tomlin, Indianapolis.
65 *Blood Clot Dressing in Simple Mastoid Abscess. K. K. Wheelock, Fort Wayne.
66 Vascular Hypertension in Eye, Ear, Nose and Throat Diseases. W. J. Leach, New Albany.

63 and 64. Abstracted in THE JOURNAL, Oct. 30, 1915, pp. 1576 and 1577.

65. Abstracted in THE JOURNAL, Oct. 30, 1915, p. 1578.

Journal of Experimental Medicine, Baltimore

July, XXIV, No. 1, pp. 1-104

67 Effect of Adult Chicken Organ Grafts on Chick Embryo. J. B. Murphy, New York.
68 *Immunity Factors in Pneumococcus Infection in Dog. C. G. Bull, New York.
69 *Agglutination of Bacteria in Vivo. C. J. Bull, New York.
70 *Agglutinability of Blood and Agar Strains of Typhoid Bacilli. C. G. Bull and I. W. Pritchett, New York.
71 Cultivation of Tubercle Bacillus from Sputum by Method of Petroff. R. A. Keilty, Philadelphia.
72 *Variations in Pneumococcus Induced by Growth in Immune Serum. L. M. Stryker, New York.
73 *Conditions and Characters of Immunity Produced in Guinea-Pig by Instillation of Horse Serum into Nose. H. Sewall and C. Powell, Boulder, Colo.
74 Differentiation of Cells as Criterion for Cell Identification, Considered in Relation to Small Cortical Cells of Thymus. V. Danchakoff, New York.

68. **Immunity Factors in Pneumococcus Infection.**—It is suggested by Bull that the incubation period of infectious diseases is due to the fact that the infecting agents must become adapted to the adverse conditions encountered in the newly infected host before they can multiply sufficiently to produce the symptoms of disease. It is further suggested that epidemics may arise because the infectious agent is passed from person to person in the ascending stage of the disease and thus enters new hosts in a state of maximum resistance to the natural antibodies of such individuals. When early contacts are avoided, epidemics tend to subside because the infectious agent is weakened by the action of acquired antibodies during the period of convalescence.

69. **Agglutination of Bacteria in Vivo.**—The degree of agglutination and opsonization of bacteria within the animal body Bull found is inversely parallel to the infectiousness of the bacteria for the host.

70. **Agglutinability of Typhoid Bacilli.**—Cultivation on 10 per cent. rabbit blood agar did not affect the agglutinability of fifty-seven strains of typhoid bacilli. Bull and Pritchett were unable to confirm the observations of Gay and Claypole on the variation in agglutinability caused by cultivating the typhoid bacillus on blood agar. A typhoid bacillus showing irregularity in fermentation, agglutination and indol production is described.

72. **Cultural Variations in Pneumococcus.**—Stryker's work shows that the growth of virulent pneumococci in homologous immune serum produces (*a*) variations in agglutinability, (*b*) decrease in virulence, (*c*) inhibition of capsule formation, (*d*) increase in phagocytability with normal serum, and (*e*) change in absorption power and antigenic properties. Reversion to the original type in these changed forms takes place on animal passage.

73. **Immunity Produced by Instillation of Horse Serum.**—Sewall and Powell deduce from their observations that the peculiar value of rest in the treatment of infection depends on the fact that absorption of minimal amounts of toxic matter produces a positive protective reaction in the organism, while the absorption of larger amounts renders the cells hypersensitive. The biologic response to the intoxication is probably chiefly determined within the first forty-eight hours of absorption, and, therefore, rest at the beginning of an infective process has preponderant prophylactic value.

Journal-Lancet, Minneapolis

July 1, XXXVI, No. 13, pp. 371-401

75 Classification and Treatment of Nephritides. M. H. Fischer, Cincinnati.
76 Medicine and State. C. Williams, St. Paul.
77 Visit to Mayo Clinic. J. E. Moore, Minneapolis.
78 Rupture of Bladder; Report of Two Cases. E. P. Quain, Bismarck, N. D.
79 Prevention and Treatment of Tetanus. H. E. Robertson, Minneapolis.

Laryngoscope, St. Louis

June, XXVI, No. 6, pp. 937-1009

80 *Treatment of Hay-Fever. H. Wilson, Detroit.
81 Streptococcus Mucosus Capsulatus Infection of Mastoid Bone; Report of Case. R. L. Loughran, New York.
82 Catarrhal Deafness, with Suggestions as to Treatment. W. E. Dixon, Oklahoma City.
83 Perforating Wound of Frontal Sinus Resulting in Meningitis and Death; Report of Case. W. W. Carter, New York.

84 Correction of Depressed Nasal Deformity by Transplantation of Conjoined Bone and Cartilage. W. W. Carter, New York.
85 Case of Pemphigus Involving Nose and Throat Due to Streptococcus Hemolyticus. Treatment with Autogenous Vaccine. W. H. Haskin, New York.
86 Case of Eighth Nerve Neuritis with Interesting Galvanic Findings. G. W. MacKenzie, Philadelphia.
87 Case of Curious Nasal Reflex. Sneezing and Vomiting Due to Presence of Nasal Spur. F. Hazlehurst, Jr., Baltimore.

80. Treatment of Hay-Fever.—Twenty-six cases were treated by Wilson with pollen solutions and twenty-two with calcium chlorid. He says that the desensitization of hay-fever patients by means of specific pollen solutions will materially relieve a small percentage of them if treatment is begun early enough. Pollen solutions for therapeutic use should be prepared and used with great care and understanding. When improperly prepared or used, there is danger of serious, if not fatal, reactions. Multiple sensitization is a frequent phenomenon in hay-fever subjects, and its existence may account for many failures in the treatment by means of pollen solutions. The treatment of hay-fever by means of calcium salts rests largely on empirical observations, but from the limited data at hand, if the doses are sufficiently large, and prolonged through a more or less extended time, a large percentage of patients will receive material benefit. It is possible that vernal cases yield more readily than autumnal cases. The administration of calcium salts is without danger to the patient and may be undertaken by any intelligent physician. It requires neither a careful laboratory technic, nor any special knowledge for its employment.

Medical Record, New York

July 8, XC, No. 2, pp. 47-88

88 Radium Efficiency in Nonmalignant Surgical Conditions. R. Abbe, New York.
89 Radium in Field of Laryngology. D. B. Delavan, New York.
90 *Fractures in Children. J. Grossman, New York.
91 Woman's Duty in Antituberculosis Crusade. S. A. Knopf, New York.
92 Requirements of Gonococcus for Its Natural and Artificial Growth. L. D. Bristol, University, N. D.
93 Case of Esophageal Stricture. H. F. Goodwin and C. H. Keogh, Chicago.
94 Case of Adiposis Dolorosa. C. M. Nice, Birmingham, Ala.

90. Fractures in Children.—Grossman's paper is based on the study of 200 cases of fractures, divided as follows: Fracture of the clavicle, 50. Fracture of the humerus, 48: (*a*) surgical neck, 3; (*b*) shaft, 5; (*c*) lower end, 40. Fractures of the forearm, 92; (*a*) shaft of the radius, 20; (*b*) shaft of the ulna, 5; (*c*) olecranon, 3; (*d*) both bones, 24; (*e*) lower end of the radius, 40. Fractures of the leg, 10: (*a*) tibia, 5; (*b*) fibula, 5. There were 130 in males and 70 in females. The ages were between 14 days to 11 years. The cause in the majority of the cases was a direct injury.

Missouri State Medical Association Journal, St. Louis

July, XIII, No. 7, pp. 305-368

95 Plea for Merit System and Civil Service in Eleemosynary Institutions. C. R. Woodson, St. Joseph.
96 Diabetes Insipidus. G. Richter, St. Louis.
97 Sleep and Its Disorders. G. W. Robinson, Kansas City.
98 Experiences in Canal Zone with Special Reference to Malaria and Leprosy. A. M. Napier, St. Louis.
99 Syphilis of Circulatory System. O. O. Smith, St. Louis.
100 Two Cases of Influenzal Meningitis. E. E. Moody, Joplin.
101 Case History of Beginning Tabes. E. G. Mark and H. E. McCarthy, Kansas City.

New Jersey Medical Society Journal, Orange

June, XIII, No. 6, pp. 259-338

102 *Abderhalden Reaction in Mental Diseases. H. A. Cotton, E. P. C. White and W. W. Stevenson, Trenton.
103 Anthrax. A. S. Ross, Camden.
104 Reminiscences of Some of Older Physicians. D. St. John, Hackensack.
105 Reminiscences of Atlantic County Physicians. P. Marvel, Atlantic City.
106 Reminiscences of Cumberland County Physicians. T. J. Smith, Bridgeton.
107 Reminiscences of Members of Passaic County Medical Society. W. B. Johnson, Paterson.
108 Sketch of Hudson County's Medical Past. F. D. Gray, Jersey City.
109 Brief History of State Hospital at Trenton. H. A. Cotton, Trenton.
110 Brief History of State Hospital at Morris Plains. E. M. Fisher, Morris Plains.
111 Brief History of New Jersey Sanatorium for Tuberculous Diseases. S. B. English, Glen Garden.

102. Abderhalden Reaction in Mental Diseases.—The Abderhalden test was studied by the authors in 289 cases, including the various psychoses and some normal individuals. The results were practically negative except in dementia praecox and epilepsy. In dementia praecox 81 per cent. of the cases showed a positive reaction to sex gland and in three cases out of fifty-five gave a positive reaction to the thyroid and sex; two of these were the catatonic type. Differential count of the blood shows rather characteristic conditions in dementia praecox; namely, high red blood cells, very low white cells and high lymphocyte count and low polymorphonuclear. In epilepsy practically all cases, sixty-nine, gave a positive reaction to suprarenal gland.

New Mexico Medical Journal, Las Cruces

June, XVI, No. 3, pp. 69-101

112 Obstetric Anesthesia and Analgesia. E. F. Frisbie, Albuquerque.
113 Interpretation of Cardiac Irregularity. C. E. Edson, Denver.
114 Effect of Trauma on Development of Cranial Bones; Report of Case. E. P. Palmer, Phoenix.

Pennsylvania Medical Journal, Athens

June, XIX, No. 9, pp. 647-724

115 *Pyelitis. F. E. Ross, Erie.
116 Thyroid Therapy. W. H. Good, Philadelphia.
117 Treatment of Exophthalmic Goiter by Means of Roentgen Rays. G. E. Pfahler and J. D. Zulick, Philadelphia.
118 Hyperphoria and Its Management. W. W. Blair, Pittsburgh.
119 Rôle of Rhinologist in Hypophysial Surgery. L. H. Landon, Philadelphia.
120 Luzerne County Medical Society and Its New Building. L. H. Taylor, Wilkes-Barre.
121 Our Medical Home. C. W. Bachman, Reading.
122 Constitutional Effects of Surgical Focal Infections. E. LaPlace, Philadelphia.
123 Methods and Results of First Aid as Established by Pittsburgh and Lake Erie Railroad Company. J. D. Milligan, Pittsburgh.

115. Abstracted in THE JOURNAL, Oct. 30, 1915, p. 1578.

South Carolina Medical Association Journal, Greenville

June, XII, No. 6, pp. 159-191

124 Refractive Errors. M. Crook, Spartanburg.
125 Anatomy, Physiology and Pathology of Large Intestine, with Some Observations on Radical Operation for Colonic Tumors. W. J. Mayo, Rochester, Minn.
126 Preventive Medicine as Applied to Chronic Pyogenic Infections. J. H. Gibbes, Columbia.
127 Treatment of Diabetes Mellitus. W. H. Powe, Greenville.
128 Heat in Inoperable Uterine Cancer. A. E. Baker, Charleston.
129 Practical Suggestions in Infant Feeding for General Practitioner. W. P. Cornell, Charleston.

FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

British Medical Journal, London

June 17, I, No. 2894, pp. 841-872

1 *Fasting Treatment of Diabetes. E. I. Spriggs.
2 *Simple System of Skeleton Splinting. C. M. Page.
3 Cage Splint for Fractures of Humerus. E. M. Cowell.
4 *Inhibitory Action of Saliva on Growth of Meningococcus. M. H. Gordon.
5 Behavior of Hypochlorites on Intravenous Injection and Their Action on Blood Serum. H. D. Dakin.

1. Diabetes Treated by Fasting.—Eight cases are cited by Spriggs. Fasting, up to several days, was well borne by cases of mild and severe diabetes of ages ranging from 24 to 79. The urine was made free from sugar, the blood sugar was reduced and acidosis greatly diminished. All the patients felt better for the fast. In most cases the food could be increased gradually, without glycosuria, until a more liberal diet was being taken than before treatment. The rapid abolition of sugar had an excellent mental effect. It shortened tedious treatment, and enabled more time to be given to finding out what food should be taken and in what quantity. Spriggs emphasizes the fact that the gradual

increase of food after the fast calls for skilled dietetic arrangements and careful daily attention. It is not so easy as an ordinary strict diabetic diet. It is useless, however, except in the mildest cases, to increase the food quickly after the fast, as sugar returns at once. During the gradual increase of food the patient is undernourished. In severe cases courage and endurance are called for on his part, as it may be necessary to keep him so short of food that he is inefficient. Regular estimation of the blood sugar should be made. In some cases of diabetes as good an effect may be attained, though much more slowly, without fasting and subnutrition, with its risk of depression and weakness, provided the patient is willing to keep permanently to the diet which has been found by careful testing to be suitable to his case.

2. **Simple System of Splinting Skeleton.**—The stock material used by Page consists of 5-foot lengths of annealed mild steel one-half inch by one-eighth inch of standard type. The strips are drilled throughout their length at 1 inch intervals with holes of one-eighth inch diameter. Split steel rivets five-eighths inch by one-eighth inch are required to couple the various lengths after they have been bent to form the splint required.

4. **Antimeningococcal Action of Saliva.**—The experiments reported by Gordon show that normal saliva inhibits growth of the meningococcus on solid artificial culture medium and that saliva from carriers has a similar action. Nasal mucus from normal persons has no such inhibitory effect on the growth of meningococcus. A quantitative experiment showed that fresh saliva does not entirely lose this inhibitory influence when diluted a hundred fold. So pronounced is the antagonism of saliva to growth of the meningococcus in culture, that in a given experiment a volume of broth suspension containing living meningococci at the rate approximately of 1,000 million per c.cm. was prevented from growing by admixture with an equal volume of fresh saliva. This antimeningococcal action of saliva is due to its living bacteria. The inhibitory action of saliva appears to be chiefly due to mixed salivary streptococci. Pure cultures of the predominant streptococci, when tested individually, were found to exert comparatively slight inhibitory influence on the growth of meningococcus. These observations demonstrate the practical importance of avoiding contamination with saliva when swabbing the nasopharynx of suspected carriers of the meningococcus.

Journal of Tropical Medicine and Hygiene, London

June 15, XIX, No. 12, pp. 141-152

6 *Hunger Swelling in Poland. B. Budzynski and K. Chelchowski.
7 Culex Pipiens Breeding Sixty-Six Feet Below Ground. M. E. MacGregor.
8 *New Human Intestinal Flagellate in Anglo-Egyptian Sudan. A. J. Chalmers and W. Pekkola.

6. **Hunger Swelling in Poland.**—This is an abstract of a paper read at the Medical Society at Sosnowiec, in Poland, in July, 1915. It describes a series of 110 cases of a peculiar affection occurring among the inhabitants of certain towns in Poland as a result of the insufficiency and inadequacy of food following German occupation. The name "hunger swelling" has been applied to it. The most characteristic symptoms of this disease of malnutrition were edema, debility and muscular weakness, intestinal disorders, mental depression, dimness of vision, disappearance of sexual impulses, and alterations in the blood and urine. The edema resembled that met with in kidney disease, although, as a rule, it began in the lower extremities. It might be confined to the lower limbs, but more often spread over the whole body, involving the face, and especially the eyelids, in cases in which it might be so great as to interfere with vision. It sometimes led to bursting of the skin with serous exudation, and so stretched the skin that pink scars like striae gravidarum resulted from it. The swollen extremities usually felt cold to the patient, and were cold to the touch, and the swollen skin was definitely painful when pinched up between the fingers. After one or two weeks in the hospital the edema might disappear; on the other hand, it might persist for months, and even recur after it had subsided. It usually disappeared from above downward, the last place for it to go being the feet. With the disappearance of the edema marked wasting was evident, the patients sometimes being reduced to mere "skin and bone." The wasting was usually associated with incontinence of both urine and feces.

The skin was, as a rule, dry and painful. The mental faculties were, as a rule, distinctly lowered. An almost constant symptom was hemeralopia, or day blindness. The most marked alteration in the blood consisted in a reduction in the percentage of hemoglobin (about 50 per cent.), and a corresponding reduction in the color index. There was a diminution in the number of red blood corpuscles, and a definite increase in the number of white blood corpuscles. The urine was pale, like water, usually alkaline, and contained neither albumin nor sugar. The amount of urine passed per diem varied greatly, but on the whole was increased, sometimes reaching 60 ounces and over even when the swelling was disappearing. In mild cases, under the influence of a more generous dietary, recovery took place; in severe cases the disease was liable to go on to a fatal issue, and eight out of 110 patients died.

8. **Human Intestinal Flagellate.**—The authors name this organism *Octomitus hominis* Chalmers and Pekkola, 1916, and define it as follows: "Flagellate nonameboid organism measuring about 6 by 3 microns and possessing six anteriorly directed flagella of variable size and sometimes of considerable length springing from a single or double well-marked blepharoplast situated close to the anterior margin. Nucleus, single, roundish, often homogeneous with well marked membrane and sometimes with a karyosome, and situated at some distance from the anterior extremity. Two axostyles are present arising from the blepharoplast and ending near the posterior margin in two small chromatic particles (axoplasts) from which arise the posterior flagella. Periplast thin without markings, cytostome absent, cytoplasm with vacuoles but not swollen out with gelatinous material and not possessing chromatophores. Known habitat: Intestine of man in Anglo-Egyptian Sudan."

Lancet, London

June 17, I, No. 4842, pp. 1203-1244

9 Treatment of Infected Wounds by Physiologic Methods. A. E. Wright.
10 Etiology of Shell Shock. H. Wiltshire.
11 Failure of Right Side of Heart as Result of Extensive Pulmonary Disease. F. J. Poynton.
12 Effect of Ferrivine and Intramine on Syphilis. L. W. Harrison and C. H. Mills.
13 Case of Erb Duchenne Paralysis Due to Bullet Wound of Fifth Cervical Nerve. G. L. Preston.
14 Diagnosis of Dextrosuria and Pseudolevulosuria. P. J. Cammidge.
15 Gunshot Wound of Right Orbit and Maxilla. W. J. Collins.
16 Two Cases of Strangulated Umbilical Hernia. F. L. H. Brown and E. W. G. Masterman.
17 Case of Tendon Transplantation for Wrist Drop. A. K. Henry.

Annales de Médecine, Paris

May-June, III, No. 3, pp. 193-322

18 Psammoma Developing on Meninges Below the Thalamus in Woman of Fifty-Seven. (Sur les tumeurs de la région hypothalamique du cerveau intermédiaire.) S. Livierato and G. F. Cosmettatos.
19 Agglutination in Typhoid and Paratyphoid Fevers. (Les réactions agglutinantes dans les infections typhoïdiques et paratyphoïdiques. Etude comparée des indications fournies par l'hémoculture et le sérodiagnostic.) A. Cade and E. Vaucher.
20 Primary Tumors of the Pleura; Three Cases. E. Pallasse and C. Roubier.
21 Reflex Paralysis and Reflex Trophic Disturbances Consecutive to Wounds of the Limbs. (Paralysies réflexes et troubles trophiques réflexes consécutifs aux blessures des extrémités. Contribution à l'étude des "névralgies et névrites ascendantes.") H. Gougerot and A. Charpentier.
22 *Rôle of Infection in War Nephritis. P. Ameuille.

22. **Infectious Factor in Nephritis in Troops on Active Service.**—Ameuille describes ten cases of acute nephritis in men on active service in which an infectious factor seemed probable but could not be definitely determined. The findings post mortem in the kidneys and certain features of the clinical course testified to an infectious process. In one case the nephritis developed during a latent phase of meningococcus infection. Only in one of the other cases were the blood findings and seroreaction positive. Paratyphoid B

bacilli were found in this case. These negative findings suggest the possibility that the nephritis may be the work of some new infectious germs for which the trench digging and trench life may be responsible. Germs that have never before been brought in contact with human organisms may have been unearthed by the trench excavations. This suggestion is reenforced, he remarks, by the fact that the sappers of the engineering corps formed 7.5 per cent. of the nephritis cases, a relatively enormous proportion. Certain other new infectious diseases have developed in trench life, as for example that curious trench fever which affected the British troops in Flanders and which seems to be the work of a virus living in the blood. The men affected came from different corps, so there was nothing to suggest an epidemic character. During one fortnight three cases of acute nephritis developed in one regiment but the men were in different battalions and the methods of relieving service in that sector made it almost impossible that there could have been any contact between these men. The next question is whether it is a unique and specific infection with an affinity for the kidneys, or whether there are various infections which may any or all of them strike at the kidneys as the point of least resistance on account of the local predisposition entailed by the stress of the campaign.

Archives des Maladies du Cœur, etc., Paris

June, IX, No. 6, pp. 237-284

23 *Case of Mitral Stenosis with Patent Foramen of Botallo. (De la sténose mitrale avec communication interauriculaire.) R. Lutembacher.

23. **Communication Between the Auricles with Mitral Stenosis.**—The persistence of the foramen of Botallo nullified to a certain extent the injurious influence of the mitral stenosis in a case reported, as also in a number on record. Notwithstanding the extreme stenosis of the mitral valve, the woman lived to be 61, passing through seven pregnancies. Not until the last few years were there any signs of heart trouble. Firket has reported a similar case, the woman living to 74 and passing through eleven pregnancies. This tolerance cannot be counted on, however; Moureyre's patient died at 25 and Dufour and Huber's at 26. Most writers regard the coexistence of the two anomalies as a fortunate coincidence, but Lutembacher thinks there is a certain relation between the two congenital lesions; the mitral stenosis causes so much pressure in the left auricle that the opening in the septum gets no chance to close up.

Bulletin de l'Académie de Médecine, Paris

June 6, LXXV, No. 23, pp. 671-696

24 *Syphilis as a Factor in Appendicitis. (L'origine syphilitique de l'appendicite.) Gaucher.

25 Medicosurgical Control of Soldiers and the Soldier's Rights as an Individual. (Chloroformisation obligatoire dans le service militaire pour le diagnostic ou la thérapeutique sans opération sanglante.) M. Reynier. See Paris Letter, p. 217.

26 *Whooping Cough in Adults. (Sur l'épidémie actuelle de coqueluche et sur la fréquence anormale de cette maladie chez l'adulte.) P. Tissier.

27 *Juvenile Delinquency and Prophylaxia. (L'enfance délinquante. Etude médico-légale.) A. Collin.

24. **Syphilis as a Factor in Appendicitis.**—Gaucher replies to his critics (see abstract 40, p. 155), that in a recent series of thirty-three operative cases of appendicitis, the Wassermann reaction was positive in 43 per cent. Syphilis, inherited or acquired, is often responsible for a subinflammatory lesion in the appendix on which acute appendicitis is particularly liable to develop. In one family one child has had enterocolitis, the other appendicitis. The father has never contracted syphilis, but the Wassermann reaction is positive in him and also in the two children, but negative in the mother. The syphilis traces back to the paternal grandfather, who is known to have had the disease. In conclusion he remarks that physicians in particular shrink from accepting his statements, as "too many physicians and physicians' children have been operated on for appendicitis, because medicine is one of the professions which furnishes the largest contingent to syphilis."

26. **Prevalence of Whooping Cough at Paris.**—Tissier calls attention to the 18, 19 and 25 deaths from whooping cough at Paris during three weeks in April, and to the increasing prevalence of the disease since then. Among the 37 cases he encountered in the early spring, 25 were in adults, and of the 76 cases during April and May, 47 were in adults. In every instance the adults had the disease first, and the children contracted it later from them. The disease was diagnosed in the adults at first as grippe, nervous cough, tonsil cough, etc., and the persons affected kept at their work, thus spreading contagion. The true nature soon became evident by the developing of typical pertussis in the children of the family, by the inefficacy of treatment as for grippe, etc., and by the benefit from treatment for pertussis. For this he uses iodoform, chloroform and bromoform. Applied early, the pertussis rapidly yields to treatment and bronchopulmonary complications are warded off, he states.

27. **Juvenile Delinquents.**—Collin has examined large numbers of delinquent minors. He found that about 10 per cent. were grossly abnormal, epileptics, perverts, etc., while about 30 per cent. were normal and owed their delinquency to their environment. About 60 per cent. were abnormal from the physician's standpoint. Some of them showed signs of an inherited toxic-infectious taint which had interfered with their normal development in early infancy. Those in this group require treatment. These same influences affected the children in another group but did not entail anomalies in physical development. There is not much chance for improvement by therapeutic measures in this group. In another group there were mental and physical signs of injury from some infectious disease in early childhood. The fourth and last group was composed of minors with evidence of gastro-intestinal trouble or tuberculous infiltration. Their psychic excitation is closely connected with their organic condition. He says in conclusion that it is only thus by studying the past that we can appreciate the present status of the child and estimate the outlook for his future. Inversely, every anomaly of development in a child from 1 to 3 years old and every persisting change in the character, at that age, should call and hold the attention of the physician so that rational treatment may be applied while there is still time.

Journal de Médecine de Bordeaux

June, LXXXVII, No. 8, pp. 145-164

28 The Neuron in Relation to the Physiology and Pathology of the Peripheral Nerves. L. A. Pitres.

29 *Advantages of Systematic Graduated Muscular Work in Treatment of Pulmonary Tuberculosis. (Du travail musculaire systématisé comme traitement de la tuberculose pulmonaire.) H. Hamant and C. Colbert.

30 Anticholera Vaccination at Saloniki. (Sur la vaccination anticholérique.) L. Verdelet.

29. **Work in Systematic Treatment of Pulmonary Tuberculosis.**—Hamant and Colberg describe the results obtained at the Hauteville sanatorium during 1914 with the systematic application of the principle of intermittent auto-inoculation by means of graduated muscular exercise. The patients were all men, and the complete course took six weeks at least. The first grade of the course, after a two-weeks' rest, was a daily walk. The last grade included road-making with shovel or pickaxe, supplemented by a gentler exercise with outdoor bowling. The work is graduated according to the answer to the question, "Is the exacerbation approaching its close or is it terminated?" Any developing poussée is a contraindication to exercise. The thermometer is the principal criterion, but this alone is not enough. The physiologic condition as a whole must be regarded, and the debilitated, with unstable heart action, should be excluded from this method of treatment. Patterson is guided by the temperature, the quantity and quality of the expectoration, the weight, fluctuations in the appetite, subjective sensations of the worker, and the opsonic index. Dumarest is guided more by the auscultation findings. Headache, anorexia or fever must be regarded as evidence of excessive auto-inoculation and call for a halt at once. Actual hemoptysis was never observed and Patterson states that it has never occurred at his sanatorium during this "work cure." The subjective benefit from being allowed to exercise is an important factor in the results. Appetite and sleep return. Expe-

riences at Hauteville indicate that a rise of one degree Centigrade is the limit for a salutary reaction. Another law that has been worked out from the experiences reported is that the temperature reaction is not necessarily proportional to the severity of the pulmonary lesions. This negative law illustrates the difficulties of the problems that have to be met in carrying out a systematic work cure. The physician undertaking it must give his whole time to it; he must live with his patients. Without this constant surveillance of the minutest details and at every minute, the method is liable to do harm.

Paris Médical

June 7, VI, No. 25, pp. 565-580

31 Contusion of the Hip Joint. (La contusion de la hanche.) R. Grégoire.
32 Colloidal Gold as Adjuvant in Treatment of Typhoidal States. Barachon.
33 *The Medical Group in Parliament and Its Influence. (Le groupe médical interparlementaire et nos organismes professionnels.) Granjux.
34 Operating Room on the Firing Line. (De la chirurgie dans les postes chirurgicaux avancés.) H. Costantini.
35 Dentistry Service for the Troops. (Organisation d'un service dentaire dans un régiment d'infanterie.) Grenier.

33. **The Interparliamentary Medical Group.**—This is the name assumed by the little company formed of the medical members of the two houses of parliament in France. They form a regular organization with president and four secretaries, and meet to discuss matters affecting the profession and the public health in general. Granjux here relates instances showing that while various medical associations receive but scant attention and courtesy from the powers that be, as a rule, when they depute the "interparliamentary medical group" to be their spokesman, it is quite another story. This is a new force which may enhance materially the welfare and prestige of the profession.

Presse Médicale, Paris

June 15, XXIV, No. 34, pp. 265-272

36 Typhoid with Superposed Paratyphoid. (Les fièvres typhoïdes intriquées.) A. Chantemesse and A. Grimberg.
37 Complications in Lungs and Pleura with Extensive Wounds of the Nerves. (Sur la fréquence des complications pleuro-pulmonaires et leur rôle comme facteur de gravité chez les grands blessés nerveux.) G. Roussy.

Berliner klinische Wochenschrift

March 20, LIII, No. 12, pp. 297-328

38 Improved Technic for Roentgen Work. (Die Röntgenstrahlenerzeugung in der neuen gasfreien Röhre und Spezialapparate zu ihrem Betriebe für Diagnostik und Therapie.) K. Lasser. Concluded in No. 13.
39 *Isolated Sclerosis of the Pulmonary Artery. C. Hart.
40 *Cystoscopic Control of Radiotherapy of Uterine Cancer. (Cystoskopie und Bestrahlungserfolge beim inoperablen Uteruscarcinom.) F. Heimann.
41 Medicomechanical Treatment After Operations for Fracture, etc. (Die Bewegungstherapie in der Extremitäten-Chirurgie; die Form ihrer Anwendung; ihre Grenzen, mit bes. Berücksichtigung kriegschirurgischer Tätigkeit.) K. Müller. Concluded.
42 Red Rays in Therapy. (Die Neon-Lampe für medizinische Zwecke.) K. Skaupy.

39. **Isolated Sclerosis of the Pulmonary Artery.**—Hart adds two new cases to the few on record in which the pulmonary artery alone seemed to be the site of sclerosis. These patients are usually young and without pathologic antecedents. When older persons present sclerosis of the pulmonary artery there are usually signs of more or less lung trouble or trauma of the chest. The two cases he reports were like the five published by Romberg and others in which young men or women developed symptoms suggesting mitral insufficiency, but necropsy revealed that the valves were intact and that the hypertrophy of the right ventricle was secondary to sclerosis of the pulmonary artery. In one of the cases on record there was a history of excessive beer drinking. In the two new cases, the left ventricle was small and atrophied as if it had not been receiving enough blood to keep it in tone. The only plausible assumption to explain the trouble is a congenital faulty constitution of the pulmonary artery, accompanied possibly by unusual narrowness of the pulmonary veins. The latter was pronounced likewise in some of the cases on record. This starts a vicious circle which explains the symptoms and the course.

40. **Cystoscopic Control of Uterine Cancer.**—Heimann's experience has confirmed the importance of the information to be derived from the aspect of the bladder and tests of kidney functioning as to whether a cancer in the uterus is still operable, and likewise as to conditions after an operation. The cystoscope also tells whether it is necessary to sacrifice a fragment from the bladder in eradicating the malignant disease. He has been making a special study of the cystoscopic findings with inoperable uterine cancer, following them through their course, and gives the details of six cases of inoperable cancer given systematic Roentgen treatment, thus enabling conclusions to be drawn as to the effect of the radiotherapy. Retrogression of edema of the bladder wall and of bullous edema was frequently observed, and this indicated profound modification in the circulation throughout the region under the influence of the exposures. The palpation findings and the cystoscope findings showed parallel ups and downs at times, but not invariably. On the whole, Heimann advocates cystoscopic control of uterine cancer as extremely instructive and reliable.

Correspondenz-Blatt für Schweizer Aerzte, Basel

June 17, XLVI, No. 25, pp. 769-800

43 Importance of Partial Antigens in Treatment of Tuberculosis. (Partialantigene und Tuberkuloseforschung.) W. Müller.
44 Arrhythmia. (Klinisches über die unregelmässige Herztätigkeit.) H. Ryser. Continued.

Gazzetta degli Ospedali e delle Cliniche, Milan

June 8, XXXVII, No. 46, pp. 721-736

45 Antitetanus Serum Plus Intravenous Phenol Solution in Treatment of Tetanus; Three Cases. (Alcuni casi di tetano trattati con la cura mista.) G. Orrano.

Policlinico, Rome

June 11, XXIII, No. 24, pp. 741-772

46 *Casein Test for Pancreas Functioning. (Sulla misura della digestione triptica della caseina col metodo di Sorensen.) G. Izar.
47 Aneurysm of Femoral Artery and Vein. (Intorno a 2 casi di aneurisma arterio-venoso della femorale.) C. Bacci and G. Cavina.

46. **Casein Test for Pancreas Functioning.**—Izar refers to Sörensen's casein technic by which the proportion of trypsin present is determined by the degree of acidity developing when the casein has been subjected to the action of the ferment and has then been treated with formaldehyd and phenolphthalein. He regards this technic as accurate and reliable but describes a slight modification which avoids certain sources of error. Three tables are given of the findings with parallel tests.

Brazil-Medico, Rio de Janeiro

May 6, XXX, No. 19, pp. 145-152

48 *Operative Cure of Syphiloma of the Rectum. (Um caso de syphiloma do recto curado pela rectotomia.) C. Werneck.

May 13, No. 20, pp. 153-160

49 *Abdominal Pain in Women. II. (Semiologia da dor abdominal direita na mulher.) R. Vaz.

May 20, No. 21, pp. 161-168

50 The Work of the Medical School Inspector. (Inspecção medica das escolas.) O. Clark.

48. **Operative Treatment of Syphiloma of the Rectum.**—Werneck has seen many cases of syphilitic affections in bones and organs absolutely rebellious to medical measures, but in which resection was followed by a complete cure and healing was soon complete. He pleads therefore to resort to the knife as a routine measure, without wasting too much time on drugs alone. Among the typical cases cited is that of an ulcerating gumma in the trochanter region, one of the sternum and others in bone or testicles. These experiences convinced him of the necessity for combining operative and medicinal measures. Each case of course has its individual indications, but the old teaching that syphilitic lesions should not be given surgical treatment is entirely too sweeping. In a recent case an ulcerating syphilitic tumor on the rear wall of the rectum showed no benefit from medical measures, and the cachexia suggested cancer while the pains required morphin four or five times a day. The Wassermann was negative and the microscopic findings showed merely an inflammatory process. An iliac anus was provided and the

lesion resected, with the result of a speedy and complete cure, the natural anus functioning perfectly.

49. **Abdominal Pain in Women.**—The first part of Vaz' article was reviewed in Abstract 85, p. 82. He here gives illustrations of the attitudes typical with abdominal pain from different causes. He warns that in examining for tender points the pressure should be applied gently at first and gradually increased. Disease of the bile apparatus usually induces pain in the upper portion of the right abdominal zone. It is more or less continuous when the liver is involved, aggravated by pressure and by breathing movements. He cites the special points where pain may be expected with gallstones. With perihepatitis without effusion the pain in the hypochondrium is usually intense and lancinating, accompanied by fremitus like that of pericarditis. With suppurating perihepatitis, the radiation of the pain upward and downward may aid in locating the pus collection, whether it is on the front or upper part of the liver or on its lower aspect. Certain forms of liver disease may develop without appreciable pain, especially biliary cirrhosis, cancer and actinomycosis.

Siglo Medico, Madrid

June 10, LXIII, No. 3,261, pp. 369-384

51 Electric Treatment of Obesity. (El metodo Bergonié como tratamiento de la obesidad.) B. N. Canovas.
52 *Suppuration in Permeable Urachus. (Un caso de permeabilidad del uraco.) P. Cifuentes.
53 The War and Insanity. (Influencia de la guerra sobre la locura.) A. Sanchez-Herrero.

52. **Permeability of the Urachus.**—Cifuentes' patient was a man of 58 who for the last three years had had disturbances in micturition, attacks of excessively frequent desires to urinate coming on every two or three months and lasting for six or eight days. Finally the umbilicus region protruded and became inflamed, and pus and urine escaped at this point. The fistula persisted unmodified by treatment, and an induration could be felt extending from the umbilicus to the bladder. This was the urachus, which was evidently the site of a phlegmonous process. The urachus was resected entirely, through the peritoneum, as soon as the general health had improved after the clearing out of the phlegmonous cavity. Peritonitis soon developed, rapidly fatal.

Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam

June 3, I, No. 23, pp. 2013-2108

54 *Mortality from Tuberculosis at Rotterdam. (Sterfte aan tuberculose te Rotterdam over de jaren 1902 tot 1914.) J. Sanders.
55 Psychic Factors in the Practice of Medicine. (Het psychische in de geneeskunde.) J. van der Torren.
56 *Essential Edema. (Elephantiasis nostras.) C. D. Cramer and C. J. C. Van Hoogenhuyze.

June 10, No. 24, pp. 2157-2236

57 *Autogenous Vaccines. (Over de behandeling van verschillende ziekten met auto-vaccins.) J. Hekman.
58 *Heart Block in Children. (Hartblok bij kinderen.) E. S. Frank and J. B. Polak.
59 Dual Perception of Sensation. (Een dubbele vertegenwoordiging van het gevoel op de schors der menschelijke groote hersenen.) C. T. van Valkenburg.
60 *Suggestions for Improved Technic for Prophylaxis of Transmissible Diseases. (Is het noodig, dat er, vooral met oog op de febris typhoidea, andere bepalingen worden gemaakt in de wet op de besmettelijke ziekten?) J. G. A. Honig.
61 *Simple and Effectual Surgical Treatment of Dysmenorrhea. (Splitting van den baarmoederhals bij dysmenorrhoe.) P. C. T. Lens.

54. **Mortality from Tuberculosis in Holland.**—The figures cited are from Rotterdam and Amsterdam during the twelve years ending with 1914. They show a reduction of 19 per cent. in the death rate for women, but this is slight in comparison to the reduction of 48 per cent. in the death rate for men of the corresponding age, between 20 and 50. This great reduction is the expression in figures mainly of the consequences of improved hygiene in work shops, etc., introduced of late years by private initiative or legislation. Improved and extended facilities for systematic treatment have cooperated in the general reduction in the death rate from tuberculosis, but hygiene in the trades has undoubtedly been the main factor. The decline has been for males of all ages from 210.1 per 100,000 living to 143.3 and for females of all ages, from 176.9 to 137.2.

56. **Essential Edema.**—A woman of 27 developed fleeting recurrent edema of the face for which no explanation could be found, the heart, kidneys and blood picture being apparently normal, the Wassermann test negative. The edema gradually extended to involve nearly the entire body, and became chronic. Diuresis was scanty, but there was no albuminuria. The woman had never left Holland and nothing to suggest filaria was found. After a period of rigors and fever, death ensued about six months after the first symptoms. By exclusion, the retrospective diagnosis was some affection of the lymph glands with a change in the composition of the lymph itself. As all other measures had proved ineffectual, thyroid and ovary treatment was given a trial toward the last, but no benefit was apparent. The assumption of a primary lymph gland affection, with the lymph becoming less fluid, seems to explain all the symptoms, including the appearance of the edema first at the points where the tissues are less compact. Comparatively little fluid escaped when incisions were made to relieve the extreme tension of the swollen legs, and the fluid coagulated in a few minutes. Conditions thus were evidently quite different from those with ordinary edema. Menstruation kept normal throughout.

57. **Autovaccine Therapy.**—Hekman applied autogenous vaccines in treatment of various affections, at the general hospital in his charge, as he relates in detail. Colon bacillus infection of the bladder and kidney pelvis showed scarcely any influence from the vaccine therapy, but a favorable influence was manifest in the cases of more or less localized staphylococcus and streptococcus infection. The results in these cases of bacteremia also justify further trials of the method. Not the slightest influence was apparent in the cases of secondary infection with pulmonary tuberculosis.

58. **Heart Block in Children.**—Frank and Polak compare a case of heart block in a girl of 2½ with analogous cases in the literature. They do not regard the prognosis in this case as necessarily unfavorable. It is already evident that the organism is adapting itself admirably to the new conditions. Earlier in life the child had been examined by physicians and nothing abnormal noted in heart or lungs, thus excluding congenital heart block. The symptoms of heart block were noticed while the child was under medical care on account of fever of unknown cause for a few days. There was no cyanosis, but a tendency to dyspnea and small weak pulse of 48. The heart was enlarged and the heart sounds were synchronous with the pulse. The auricle beat was 107 a minute, the ventricle beat 42.8. The tracings show this interfering rhythm. Digitalis retarded slightly the auricle rhythm, but displayed no action on the disturbance in conduction. They know of another case of heart block of several years' standing which does not prevent the young man from being a creditable football player and good student.

60. **Prophylaxis of Epidemic Typhoid.**—Honig relates some instances of the spread of typhoid infection which might have been prevented if the members of the family and others who had been in contact with the sick had been kept under medical surveillance during a possible incubation period and examined for carriers. He declares that this should not be left to the complaisance of the public; the physician should be empowered by law to enforce this control.

61. **Dysmenorrhea.**—Lens has noticed that in many cases of severe dysmenorrhea the uterus is in slight anteversion. With the menstrual congestion, some of the vessels become kinked, and the resulting disturbances are the cause of the pains. He has remedied this completely in a few cases by cutting a slit with sharp scissors in the rear wall of the uterine cervix on the median line. The slit is drawn open to form a V by traction from forceps on each side, and a roll of medicated gauze is left in the slit for four days. No possible harm can be done by this trifling operation, while it has cured at one stroke agonizing dysmenorrhea rebellious to all other measures. There need be no fear, he adds, of disturbance from the small cicatrix at a future pregnancy.